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THE SCOPE OF GEOGRAPHY.

THE position of any subject in the school curriculum depends upon its appraised educational worth. Sometimes the mirror of values is turned toward the future, at other times it claims to reflect the present. Geography has moved up and down the scale of educational importance since the time of the cultured Athenians, disappearing entirely from the curriculum when its import was low, returning when the public interest expanded from local to international concern, or when the physical and intellectual life of the people was focused into the same era of time. Geography has never occupied the first place in the school curriculum as a cultural subject, but in rare instances its utility has given it the highest standing, as in the school of navigation established by Prince Henry at Segres in the fifteenth century, and in modern times in the colonial schools maintained by certain European governments. The educational status of the subject has not been due to its content, but to its pedagogy. Teachers have looked upon it as a collection of facts which could be memorized; and if action rather than speech can be taken as a reflex of thought, the majority of the army of teachers still maintain this conception. This does not refer to the superior teachers in every department from the kindergarten to the college, but to the great teaching body which shapes our educational policies. This statement is not based upon deductions from pessimistic theory, but from work seen during the last year in schools located between the Rocky Mountains and Newfoundland.

The slowness of the progress of educational ideas is realized when we read what Comenius said more than three centuries ago: "We know the elements of geography when we learn the nature of the mountains, the plains, the rivers, citadels, or states according to the section of the place in which we were reared." I doubt if the pedagogues of Comenius's day lent responsive ear to his teaching, but once a true chord is struck it vibrates forever.

A century and a half later Rousseau took up the strain, and in his *Emile* says: "Let him learn his first geography in the town he inhabits, stimulating his imagination by expressing wonder as to natural phenomena."

One hundred years ago Pestalozzi did more than point out the way the pedagogically redeemed should go. He, rising higher than most educational philosophers, tested by practice his inspiring theories. Professor Louis Vuillemin in *Remembrances* describes the method of geography teaching when Pestalozzi had his school at Yverdon, Switzerland. He says:

> The first elements of geography were taught us on the soil. As a beginning our walk was directed toward a narrow valley, in the neighborhood of Yverdon, through which the Buron flows. We were made to contemplate it as a whole and in detail, until we had a true and complete mental picture of it. Then we were each invited to lay in a store of clay which was found on one side of the valley, and we wrapped it up in large sheets of paper we had brought for the purpose. On our return to the castle the long tables were divided among us, and we were left to reproduce in relief the valley which we had just studied. The following days brought new walks and new explorations, each furnishing a higher point of view, and each time a fresh extension was given to our work. We went on in this manner until we had accomplished the study of the basin of the Buron, and from the height of Monté La, which completely overlooks it, had grasped it in its entirety; and not until we had finished our reliefs, then, but only then, we passed from the relief to the geograpic map, not being shown it until we had thus acquired an understanding of it.

This, so far as I can find, is the beginning of field work, which has been carried to a greater extent in Switzerland than in any other country in the world.

Ritter made two visits to Pestalozzi's school at Yverdon and was much gratified by what he saw. He says:

> I have learned to value that method which is based upon the nature of

the child . . . . it is now my business to bring this method to bear within the domain of geography. There is between nature study and history a great gap to be filled up. I have left Yverdon firmly resolved to fulfil the promise I made to Pestalozzi, namely, to apply his method to geography.

The United States owes to Karl Ritter an especial debt of gratitude, not only for his inspiring books, but for the instruction he gave to his excellent pupil, Arnold Guyot, who brought reform in geography teaching to this country. Harvard little knew what she was doing for the schools of America when, in 1848, she called from Europe that great teacher.

Mr. W. A. Alcott wrote in the *American Journal of Education* in 1858:

Prior to this, geography as a science had received little or no attention in the United States. A few schools studied Morse's *Geography*, a few others used a sort of reading book by Nathaniel Dwight, known as *System of Geography*, which was arranged in the form of questions and answers, but the majority of schools paid no attention whatever to the subject.

In 1825 Mr. Woodbridge and Mrs. Willard published a geography which was much in advance of those then in use. Immediately afterward Mr. Woodbridge sailed for Europe, being the first American who ever traveled abroad to enrich geography teaching.

The learning of boundaries and capitals, the location of cities and rivers, was the burden imposed upon the memories of helpless children. Some ingenious teacher, realizing the unspeakable drudgery such a task demanded, devised the plan of singing the geographic text to stimulate the flagging brain over the tedious road, just as the band plays to aid the wearied soldier on his march. I cannot find the name of the author to whom the honor of that most humane invention is due, but the method prevailed in many places in the States throughout the fifties and early sixties.

In 1866 Guyot's *Common School Geographies* appeared. The teachers were poorly equipped for using them, and in the majority of schools the books were unintelligible. Hence, Guyot's *Geographies* proved a financial failure. Mr. Tucker, of New York, in a letter written recently said: "Colonel Parker, of Quincy, Mass., was one among the first teachers to take up the work of Guyot. It

was in Quincy that he introduced modeling as a means of geographic expression."

Only within the last decade in this country has geography been able to rear its modest head into the etherial realm of intellect dominated by mathematics, and move in the exclusive set of culture presided over by literature, art, and foreign languages.

According to the dictionaries, "geography" is derived from two Greek words, γέα, "earth," and γραφή, "description," and I think we may say the progress in the teaching of geography has been shown in the transfer of the stress in the pronunciation of the word to the "gea" instead of the "graphe," crudely to interpret a statement once made by Professor T. C. Chamberlin. In the study of the "gea" — the earth — there is a demand for the training of all the senses which the study of the "graphe" precludes. Preyer says: "The fundamental condition of all mentality is activity of the senses." Unless the perceptive faculties are trained, thinking will be defective and judgment unreliable.

Since the study of geography was and is relegated principally to the middle grades in the elementary school, the pedagogy of the subject has been in harmony with psychological beliefs. Reason was thought to be a function of maturity, while the faculty of memory characterized the youthful mind. With the progress of child-study has come a change in the attitude toward the subjects of study. It has been found that even young children are interested in causal relations. Mr. Earl Barnes reports, as a result of his tests with thousands of children, that the majority are interested in the use of a thing rather than in its form or color; they wish to know the relation of things in this great world about them. It is in the intelligent conception of causal relation that we find the superiority of the civilized men over the untutored savage. It is not in the mere statement of causal relation which the child may memorize that he finds pleasure, but in the solution of a problem — the problem, his problem, and not that of a teacher — that he finds the greatest satisfaction. Children, as well as the adult, like to reason from known data to unknown consequences.

The belief that memorized facts stored away in the mind will be ready for use at a convenient time, has hypnotized the best of us. We are daily surprised at the emptiness of the intellectual store-houses of our students, into which we have previously poured a wealth of choicest facts. We fail in the pedagogical application of our knowledge of psychology for the selfsame reason, that the pupil finds his facts unusable. It was not acquired through action. We forget that images which make up the fabric of vital thinking must be related.

Dr. Dewey says:

> Knowledge may be regarded as a sort of bridge, or connecting link, between some difficulty in action and a further successful or harmonized activity. Its significance lies in this intermediate position; that when knowledge is isolated from its origin and its goal it becomes artificial. From this point of view, we do not know how it came into existence, or for what it exists; in being made an end in itself it is made unreal. Knowledge is reduced to information, a load or burden of facts, which the individual has to carry without intelligent purpose.

The student discovers too late that ordinary unrelated knowledge is not power; that only scientific knowledge — unified, related experiences — are valuable.

The test we impose to discern the ability of our students is as fallacious as our knowledge-giving plan. We too often measure the student's power by what he can say, while the world classifies him by what he can do. Life justly criticises our pedagogic results.

The measure of progress in teaching geography is nowhere more strongly marked than in the use of field work. It was begun by Pestalozzi, but has made more headway in this country during the last decade than during all preceding time. Yet when the number of schools doing field work is compared with those which never leave the school buildings, the percentage is distressingly small. Field work has become an almost universal practice in the classes in geology and botany of the best universities of this country, and in some of the high schools a few excursions are made yearly. But in the elementary schools, in the majority of districts, field work is unknown. Why the teaching of Comenius, Rousseau, Pestalozzi, Ritter, Guyot, and others,

together with that of all our noted modern geographers, has failed to impress the lesson of field work upon the teaching body, finds its answer, I believe, in four separate causes: (1) The lack of appreciation by the teachers and the parents of its value in illuminating the geography work. (2) The timidity of the teachers in meeting difficulties which the field presents. Few teachers have been trained to read the expression of the world which lies about them; hence they naturally shrink from placing themselves in the position of instructor before a class of active, inquiring minds facing real, natural problems. (3) The physical strain of taking care of, say, forty pupils outside the schoolroom without proper assistance. (4) The expense which is necessarily incurred in visiting places beyond the walking distance from the school building. We know, however, that, if this objection is reduced to its lowest terms, it is not insurmountable. If field work were considered as valuable as other forms of instruction, the expense would not be prohibitive. The American people have, on the whole, what they truly want. Look at their school buildings and equipment! If we actively desired field work, it would be a part of every school curriculum. We passively want clean streets and good civic governments, but not until we make our demands active will they be granted. The majority of people really believe knowledge is acquired from books. Hence, if children can recite the contents of certain books, they are educated. Books certainly have the greatest function in our modern civilization, but we are all fortunately, or unfortunately, so constructed that we can read from books only our previous self-experience. It is the grossest absurdity to expect the child whose skyline is an eternal stretch of irregular roofs, and whose landscape is made up of dirty alleys, to appreciate the meaning of broad stretches of rolling prairies, dense tropical forests, and high, snow-capped mountains. Yet we find the books which are given to these children who are so unfortunately situated containing the same text as that provided for the children who spend their summers in the country and who travel some part of every year. I believe if the money spent on the geographies for these poor districts was devoted to field excursions, under the direction

of skilful teachers, there would be a much larger intellectual and moral return in citizenship than is received from the present investment.

With the best possible conditions the present geographic text is not what we wish it were. There has been a great improvement in the last few years; yet there is still much to be desired. Since advance in geography teaching has been largely in the universities, the best texts have been produced for the colleges. Many of the best books written for children have been produced by college professors, and in some cases they are illy adapted to elementary schools. As in everything else, we have a heavy geographic burden due to inheritance. The old cosmographies which were produced during the fifteenth and sixteenth centuries have, I believe, had no small effect upon the geographies of today. The modest title of one by Sebastian Munster, which appeared about the year 1534, illustrates their comprehensive character. It reads: *Cosmography — A Description of All the Lands and States of the Whole Earth — Its People, Animals, Products, Governments, Religions, etc.* Notwithstanding the growth of geographic knowledge, which bears in upon us as we read some of the astonishing statements in this popular work which went through twenty-four editions — such as, "the German Ocean is an inland sea," "Iceland is joined to Norway" — we might still put the same title on the cover of many geographies used in our schools today. We have attempted to boil down all the knowledge of all the countries of the whole earth into a book of, say, 160 pages, with the result that it needs much intellectual diluting to be even palatable or digestible. The geographic readers have been a great boom to teachers of elementary geography, yet more are sorely needed. The good teacher must be superior to any text, but excellent books are invaluable.

To aid in solving problems found in the field and in books a laboratory is necessary. Field excursions alone can rarely give the answers to problems which arise as to the genesis of the forms of the earth which we find around us. We see a valley and may trace its circuitous path from its source to its débouchure, but the process of valley-making is so slow, except during severe

storms, that we cannot catch nature in magnified action. Hence the physical laboratory is a necessity for the understanding of physical processes. But the pupil himself should have the problem which he has found in nature and brings to the laboratory for solution. Crude apparatus which the child understands and can easily manipulate may be of greater value in experimentation than more refined materials. In the use of a hose and a hole in the ground the child may find greater scope than in an expensive laboratory. The young children love action; hence laboratory experiments are not only fascinating to them, but intellectually productive.

There is, perhaps, no greater evidence of the progress in geography teaching than the advance in the use of maps in all the schools. Yet we regret that what Rousseau said a century and a half ago is applicable to too much of our teaching today:

> In every study signs are worthless without the idea they are to represent. Notwithstanding the child's study is confined to signs, it never becomes able to understand the things themselves. While one endeavors to give him an acquaintance with the earth, he makes the acquaintance of the map; he learns the names of cities, countries, and rivers; to the child they are nowhere except on paper.

If you doubt the correctness of the above statement as applied to present educational conditions, try the experiment upon a group of people of naming different places on the earth's surface, letting the hearers describe the first images which come into consciousness. I feel a confidence in saying that a large percentage of any gathering, geographers excepted of course, will see a map instead of the reality, for places they have never visited. Many noted teachers argue that they must see the map first, then force it out of consciousness by the image of the things or places for which it stands. This appears to be an intellectual extravagance. We cannot, I believe, place too high a value upon maps. Civilization could not exist without them, but to encumber the minds of helpless children with images of parti-colored maps, which always appear in consciousness instead of the correspondence to the real country or city, is, it seems to me, little short of a pedagogic crime. We cannot help agreeing with Rousseau in what he says in *Emile:*

> You want to teach the child geography, and you seek for globes, spheres, maps, and a host of apparatus! What is the good of all these representations? Why do you not begin by showing him the object itself, so that he knows at least what you are speaking to him about? . . . . After all, it does not so much matter that he should know exactly the topography of the country as how to teach himself about it; it matters little whether he have maps in his head so long as he understands well what they represent and has a clear idea of the art necessary to make them. Behold already the difference between the knowledge of your pupils and the ignorance of mine! They know their maps; he makes them.

It is through making maps of regions visited that the child understands conventions used in map-making. He may make a simple road map showing the direction of travel upon an excursion, or may model the relief seen in sand, or represent it by shading or hatching lines, or show it by contours, or by the international color scheme; and by so doing he gains the alphabet of maps, which is one of the highest accomplishments of the geographer.

Map-making is one of the oldest of the arts. Hence, from the history of its development we may get pedagogic instruction. Among primitive people the necessity for maps found a satisfactory response long before writing was invented. Stanley tells of the aid he received from the Uganda, who made relief maps of their country in the sands along the lakeshores. Travelers in every part of the world have acknowledged a similar indebtedness to the untutored natives, from the islands of the south seas to the frozen shores of Greenland. Finding that fixed maps could not meet the needs of the hunter, the warrior, and the seafarer, they have shown great ingenuity in the manufacture of portable maps.

The Micronesians, of Marshall Islands, made maps of their islands by fastening stones or shells to a background of woven splints of palm, the size and location of the shells or stones corresponding to the area and position of the islands. They expressed their knowledge of hydrography by widening the splints where the swells or waves increased, as would be the case on nearing land. Captain Cook paid high tribute to the cartographic ability of the south sea islanders. He told of his successful cruise through forty degrees of longitude among the Australian archi-

pelago under the guidance of Tupaya, a native of Tahiti. The Ainos of Japan, and the Tunguses and other tribes of Siberia, have won the gratitude of travelers by the maps which they have made for them. Franklin, Parry, Hayes, and other arctic explorers have expressed their appreciation of maps made by the Eskimos. The entire Aztec country was mapped when the Spaniards reached Mexico, and these maps were of such excellence that Cortez traveled hundreds of miles by their guidance. They represented mountains, rivers, towns, forests, and political divisions with much detail and accuracy. The Peruvians were also quite advanced in the art of cartography when stricken by the Spanish. They possessed relief and political maps of their country which were of great value to their destroyers.

Economic interests seem to have been a great stimulus to the ancient as well as to the modern map-makers, for the oldest map known to be in existence is one which represents a mining district in Nubia, made during the reign of Rameses II. It represents the mountains and valleys, showing rocks which were rich in ore and those which were barren, not omitting the wells and the few scattered trees along the road leading into that desolate country.

The great problem of map-making with our students as well as in the evolution of cartography has been to give graphic expression of geographic facts consistent with an assumed convention. While we may smile at the maps of the Middle Ages, which contain pictures of mountains, houses, men, and imaginary monsters, yet we must commend the motive which prompted this grotesque representation, for it was a direct appeal to the imagination, and a map which does not arouse the imagination fails in its purpose.

Hereford's very fanciful map, which gave little heed to the restraining influence of truth, but reveled in delightful imagination when knowledge was exhausted, lays high claim to usefulness, for to it is imputed the honor of so arousing the imagination of Milton that his poetic fancy gave *Paradise Lost* to the world.

The progress of map-making has been in the direction of greater truthfulness, which also means greater usefulness, but the attempt to be truthful and at the same time graphic has been

the maelstrom which has engulfed many cartographers. Those who are striving for accuracy alone in expression cry out against their fellows who are working for more dramatic representation; unwarranted exaggeration is the persistent charge. Yet the fanciful maps of the Middle Ages were more truthful in intellectual result than the best scientific maps of today that arouse only their correspondence in consciousness. But the fault is not in the maps, but in our inability to read the symbol.

It goes without saying that everything which tends to fuller geographic concepts aids in the interpretation of geographic symbols. The ease with which the untrained geographer reads a map depends upon its graphic qualities. Hence reliefs, shaded, and hachure maps offer fewer difficulties to beginners than contour, political, and those made according to the international color scheme, or other conventions. As has been said, the mapping of the region visited, using the different conventions which obtain in maps in daily use, is the surest way of understanding the symbols employed, but copying of maps, considered from the educative standpoint, has little, if anything, to commend it and much to condemn it. There is no mental activity in such a process, and much time is squandered which could be spent to better advantage.

If the student, in expressing his geographic concepts, is required to use a convention differing from the one employed in the map he has been studying, the demand will force him to interpret the map into terms of reality. If he has been studying contour maps, he should represent the relief of the area studied by modeling or by drawing with hatching lines, by shading, or by the use of some color scheme.

Progress in field and laboratory work, and the use of pictures, models, maps, and charts, in teaching geography are not the only signs which herald its progress. We are now beginning to see the relation which exists between the sciences and history. The influence of physical conditions upon the biological aspect of the race, which was so strongly brought out by Darwin and Lamarck, is now being applied to social relations. This new movement, as we wish to term it, was advocated by Herder two centuries ago when he said:

> How does it aid a youth if he merely knows what has happened and cannot locate events? Only through the aid of geography will it become clear to him why certain people had to play a rôle upon the historic stage and could play no other; why sciences, inventions, and arts — indeed, the whole civilization — took the course it has taken and no other. Geography is the basis of history and history is nothing but the geography of times and nations set in motion.

John Smith, in his history of Virginia, published in 1623, says:

> For as geography without history seemeth a carkasse without motion, so history without geography wandereth as a vagrant without certain habitation. He who studies the one without the other will undersand neither. Who despises both should live like the mole under the earth.

No historian of today would dare to claim a supreme indifference to geography. Man cannot go entirely beyond his physical environment, either biologically or socially. The effect of climate on the physical, mental, and moral condition of individuals is everywhere admitted, and the influence of topography and native products upon humanity can not be denied. Although geography has had a great influence upon human development, it furnishes only one part of the interesting story. It is true that the great fertile flood plain of the Nile, surrounded by a nearly impassable barrier, the desert, made Egypt's civilization one of the greatest which has blessed the face of the earth, but its decadence can hardly be attributed to geography. The abundance of marble, we now recognize, gave plastic art to Greece; and the geologic fault which made Wolf's cove possible changed the history of North America. Almost every social custom has a geographic basis.

With the increase of knowledge in these various directions has come the difficulty of selecting a course of study. It is impossible now for any individual to encompass the known geography of the world. Hence what not to teach is as important as what to teach. We cannot select a certain number of facts and say these facts are important, hence should be learned, because the important facts vary with every locality and, we may say, with every division of time. It may be that Hawaii seems important because of her present relation to us, but the world is gradually becoming so closely connected that it is impossible to decide who is our neighbor.

It is true that if we would be one with society, we must constantly feel the pulse-beat of social life. And the great industrial movement which is now sweeping everything before it, bringing science, art, literature, oratory, and the bayonet to its aid, cannot and should not be ignored; but it should not be given first place in our consideration. So great is the power of this movement that it can turn the heads of the wise and good, as I had evidence in India. I heard a man who is said to be one of the most learned and wisest of Anglo-Indians argue eloquently and feelingly in favor of the opium trade in India. He had lived in that country fourteen years, traveling yearly from one end of the country to the other, collecting material for a great museum of which he is director; yet he believes opium is of great value to the country. The glaring light of commercialism has blinded his ethical sight.

Since knowledge *per se* cannot be made the guide to the selection of a course of study, we must seek for it elsewhere. It is in the principles which govern the formation of the landscapes, and those which determine the distribution of peoples, their habits and customs, that we find relief. These, if properly mastered, become the keys which unlock the abstruse geography problems. The ability to interpret landscapes, to see their relation to cultural conditions, to use geographic symbols properly — pictures, models, charts, and literature — must in this day constitute the equipment of the geographer.

A course of study intended for an entire city or country can only designate the very broadest lines of study. For it is just as impossible for the suburban schools to use the same course of study, as the schools in the congested districts of the same city, as it is for the children of Jamaica to study the English botanies, which they have attempted with failure.

It is impossible to realize our ideals in teaching so long as the "factory system" ~~obtains~~ *humans* in our schools. No teacher can turn out forty pieces of humanity yearly, each bearing the same stamp, and not do violence to her better self.

Much of the departmental work is only "piece work"; it is not related to the life of the child. We need more handmade,

hand-modeled educational results; less recitation ot pedagogic platitudes and more execution; more time spent in teaching the child and less in teaching the subject. Then the child will grow into an appreciation of the harmonies of nature, man, and natural law.

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THE HUMAN RESPONSE TO THE PHYSICAL ENVIRONMENT.[1]

We think of man as living in an environment, the elements of which are largely the subject-matter of physical geography; and we are coming to realize that the true and complete geography is a study, not of physiography and the climate merely, but of the interaction between man and the physical part of his environment.

The term "environment" is so loosely used, and is made to include so much, that we must do some careful defining, to be sure of our ground, before taking up a discussion of our subject. The general conception of environment is the *not-me* which acts and reacts upon me. But this whole universe of forces and influences outside of myself is made up in part of the material world and its forces, and in part of the spiritual world and its creations, which are quite as vital in determining my career as are many of the material considerations.

So our environment is to be analyzed in a dual way, as (1) physical, and (2) social, or sociological, as Herbert Spencer had it. Over a century ago Montesquieu, in his *Spirit of the Laws,* was fairly convinced of this analysis, and wrote so clearly and with such conviction as to the influence of the physical elements in our environment as to make himself one of the greatest contributors along this line, though he wrote before there was a science of geology, or physiography, or meteorology to furnish data or establish laws. And again about fifty years later Buckle, in his *History of Civilization,* made a wonderful statement of the significance of the purely physical elements in our social evolution, so good a presentation as to have been scarcely equaled since. And even in his time the modern science of geology was scarcely out of its swaddling-clothes, and the sciences of meteorology and geography were not yet born.

Now that the tributary fields have been well worked, observa-

[1] Read before the Central Association of Science and Mathematics Teachers, Chicago, November 27, 1903.

tions by millions made and recorded, and laws enunciated, we are able to arrive at a more complete and satisfactory analysis of our environment and make ourselves ready to recognize the effect of the fundamental physical elements.

Let me take up each of the phases of our environment and see its content and its bearing.

The *physical environment* has as its elements:

1. Climatic conditions — as hot or cold, arid or humid.
2. Land relief, or topography.
   a) Barriers — as mountain, or desert, or water.
   b) Character of surface — whether flat plain, or dissected plateau, or mountainous.
3. Soil — of increasing significance as time goes by.
4. Materials and forces available in a given region.
   a) Inorganic — as metals and minerals.
   b) Organic — plant and animal resources.
5. Competitors in the realm — whether human or by the lower animals.

The *social environment* has for its sources and influences:

1. Psychic elements.
   The consciousness of kind (Giddings) giving rise to sympathy and co-operation in every stage of evolution from the lowest animal to the highest conventions of modern society.
   The law of imitation (Tarde) is quite as sweeping in its application.
2. Economic relations.
   The pursuit of wealth the keynote of social impulse — Karl Marx, and later exploited by Dr. Patten. Herbert Spencer works along the same lines in his interpretation of our society as a progress from militarism to industrialism.

Progress under these influences is at first unconscious — as truly cosmic as the adaptation of a plant to a new environment. And in all our social organization, even in the highest phases, the purely cosmic, or unconscious, response to the forces in the environment is effective in larger measure than most people would willingly admit. We have but to look about us, and see the measure of heedless unthought with which we have exterminated certain noble animal species, as the bison and the seal; or see the ravenous haste with which we have wasted a continent's resource of forest, and the utterly reckless way in which we are ravishing the stored sunshine of past ages in our coal resource, to see that

in very large measure we are as senseless and unconscious as the beasts of the field.

But though at first our evolution has been unconscious, and wholly the result of a chance geographic environment, sooner or later evolution becomes conscious and self-directed, and our noblest ideal for society is that it should become so in constantly larger measure. Lester F. Ward in his *Dynamic Sociology,* F. H. Giddings in his *Principles of Sociology,* and Benjamin Kidd in his *Social Evolution* all make much of this idea.

All these elements of environment express themselves in social institutions and conventions, which analyze themselves into a half-score of categories:

1. The organization of the family and the status of woman.
2. The idea of ownership in property.
3. Domestication of animals.
4. Agriculture.
5. Dress and adornment.
6. Shelter — leading to styles of architecture.
7. The use of metals.
8. The industrial arts — as in pottery, basketry, weaving, and the long list of mechanical inventions.
9. Forms of government — as military and industrial or economic.
10. Social forms and customs; beliefs, as superstitions, religions.

All these social conventions are in a large measure psychic, but all are secondary, or even tertiary. They are developed *after* they are initiated. All analyses of them come back to *initiation.* And the least analysis arrives at a purely psychological reaction —a nervous response to an external stimulus; that is, to living tissue, acting on a physical environment. And so conditions favoring or inhibiting origins in all these lines are found in the "deal" (borrowing a term from whist) of the elements in the physical environment. The game that may be played, whether aggressive and brilliant, or passive and inert, depends very largely upon the cards held. And in the distribution of the elements of the physical environment, and the emphasis laid on each, every realm and age deals out a different combination.

The origins of social institutions, just as truly as the origins of changes in the living body of the plant or animal, are found

in the conditions imposed by the physical environment, and *progress depends upon a surplus.* This thought is most significant and far-reaching, and has been excellently presented by Dr. Simon N. Patten in his latest work, *Heredity and Social Progress.* The principle of the surplus must be kept in mind at every step in an analysis of the influence of the physical environment. It is operative in the most primal phase of living tissue, and it applies at every stage in evolution up to the highest and most spiritual social institution. It will not be out of place to state briefly some of its principles:

1. A surplus of tissue in the cell gives opportunity for the occupation of more space. Hence a breaking up into multicellular structure and the differentiation of outer from inner tissue, and by an extension along this line of development, giving rise, in due time, to organs.

2. In the same way a surplus of energy in the individual man gives us the genius in one phase of development, and the liberal and iconoclast in another.

3. A surplus of energy in a social class impels to conquest, giving added power and leisure to the conqueror, making culture possible.[2]

I may add that a surplus of wants go hand in hand with a surplus of wealth and leisure, to make progress continuous. Contentment is a mild name for decay. A protestant is a man with a conviction, plus a good backbone, and a stiff upper lip. For such a man laws are made — to be broken. Initiative comes from such men, and progress consists often in getting out of the rut.

The physical environment, then, is important in giving the conditions for initiative, and in furnishing the opportunity for a surplus; hence making for or against progress.

The highest point of view in geography is this very study of the physical environment in its influence on man's development, as furnishing the conditions in response to which changes may or must occur, (1) in the physical organism of man, and (2) in his social organization.

But changes in man's body are almost immeasurably slow.

[2] See VEBLEN, *Theory of the Leisure Class.*

Notwithstanding the fact that our anthropoid ancestors began to abandon quadrupedal locomotion, it may be, over four million years ago, we are not yet wholly adapted in our bodies to an upright posture, as Brinton and others have shown. And the anatomists and physiologists enumerate 127 vestigial organs in our bodies — organs which are more or less useless now, but which functioned once, some of them dating back to an ancestor far less advanced than the *Pithecanthropus erectus* of Du Bois. We are familiar in our everyday life with many of these relics, such as the nictitating membrane of the eye and the vermiform appendix. It seems, as David Starr Jordan so wittily remarks, that the human body can never quite forget its past, but must carry around in itself perpetually the record of every stage in its physical evolution.

Our bodily response to the physical environment, then, is in many ways almost immeasurably slow. We may not yet name definitely the combinations in physical environment which give us color of skin, head form, peculiarities of hair structure, or cast of features. Yet we may definitely say what conditions stunt the stature and inhibit action. The intelligent farmer or breeder is well assured of the principles along these lines, and the giant Norman Percheron horses are the demonstration of the law of surplus in the physical environment; and just as truly the stunted pony of Shetland and the cayuse of Montana answer for the lack of surplus. Professor Ripley, in his *Racial Geography of Europe,* makes a beautiful application of these principles in the discussion of the influences of the thin soil and the hard conditions in the Auvergne. The response is found direct in the stunted, backward population, the miserable relic of a people pushed to the wall, in ages past, by more powerful tribes that came and evicted them from the rich and favored lower lands. And, again, that hard conditions dwarf stature may be shown in the study of the Jews. Downtrodden, persecuted, and narrowed in opportunities all over Europe, they have found in free and enlightened England an opportunity to take advantage of a surplus; and in the rich end of London, in the few generations they have been there, their average stature has been increased over an inch and a half.

Edwin Markham's biting poem on "The Man with the Hoe" focuses our attention on the power of hard conditions to stunt and warp both body and mind.

Now, while the rate of change in man's body is for the most part so slow that, under the merely cosmic response to the physical environment, we must look for results to the effect of hundreds or thousands of years of its influence, on the other hand, changes in man's social organization are taking place under our very eyes. And though some of the social institutions are of as slow growth as many of the changes in man's body, yet the conditions of social organization are often found vitally fixed in the *ensemble* of the elements of the physical environment of a particular region. A people moving from a given region in which a good measure of adaptation to the physical environment has been attained may find itself under the necessity of changing radically many of the social conventions to which it was accustomed, in order to survive. Of this we have record in almost numberless cases where frontiers have been passed by members of an old and static social order.

Such social adjustments, then, are relatively rapid, and there tends to be established a somewhat definite social order in a given type of geographic realm, which imposes itself upon almost any human stock which comes to occupy the region. Out of a dozen such type geographic regions which might be studied, let us choose one, and run rapidly over it, indicating briefly, as we may, the ways in which the physical environment reacts upon man, to limit, direct, and give character to his social status. In such a study of a type region the problem is to see how the elements of the physical environment determine social origins and shape their development. Let us take as a type region the arid area, and show the persistence of its influence in all the phases of social organization.

THE ARID AREA.

1. *The family and the status of woman.*—An arid plain in primitive society invites the chase. The animals of the realm are, in the first instance, of necessity herbivores. The scant grass and browse of such a plain calls for nimble deer, fleet of

foot and ranging widely. To follow such a food supply, the family of the hunter must be ready to move rapidly and on short notice. This need reduces the family to its lowest terms — father, mother, child — and makes nomads of them of necessity. This life makes man the bread-winner, and woman becomes a slave and chattel. Among the Amerind we have this shown in the Sioux, Apache, and other tribes of the great plains.

In such a region, if the animals are of such a nature as to be more useful living than dead, we come naturally to —

2. *The domestication of animals.*— With flocks and herds the food supply is less precarious, and the capacity of the region is greater. The family unit becomes larger. Sons and grandsons may stay in the family group. This provides a larger measure of social culture; but the family is still under the whip of uncertain forage and of migrations to pastures new. So social relations remain the same. We have the patriarch, and women are still inferior.

3. *Agriculture.*— With game scarce, the food supply is sought in plant life, and progress goes hand in hand with a domestication of plants. This locates the family along a river where water makes agriculture possible. In such a case women are, as a rule, the leaders, and become bread-winners equally with the men, or even superior to them. This means independence and power, and sooner or later social equality. With animals domesticated for draft, and milk as well, or meat, the food supply is made immensely more ample and more secure, and the home becomes static. The population becomes denser, and social customs, laws, and regulations become necessary. Here is the give-and-take of man to man which rubs off rough corners and brings in time refinement and culture. In America the Pueblo Indians illustrate these influences. In Egypt, Assyria, India, and China the earliest steps in civilization passed through these phases of development ages ago.

4. *The idea of ownership of property.*— On the arid plain individual property in *land* is unknown. It is so the world around. The ownership in the Russian steppe region, and many other similar regions in Asia, resides in the village, or the com-

munity. Our plains tribes have the very greatest difficulty in acquiring a notion of ownership in the land. It is as foreign to them as the ownership of air or sunshine to us. But where soil was from the start the source of bread, land is owned, and the thought is easy. It is well known that the private ownership of land is one of the foundation stones of our particular phase of civilization.

5. *Dress and personal adornment.*— The sub-arid plain and the pursuit of the deer restrict the material of dress almost wholly to skins. This is in itself a strong demand for simplicity of dress, and holds the dress ideal rather strictly to the law of utility. With the advent of a pastoral life, particularly with the possession of sheep, goats, or camels, the availability of wool invites weaving, thus adding extensively to the variety and quality of the materials for dress. This is in itself a large invitation for advance in the arts of civilization. When agriculture comes in such a region, plant fibers increase the variety and the invitation for development. If the region is cold, at least for a good part of the year, this is a condition which holds an iron hand on the character of dress, and does not permit a wide departure from the fundamental law of utility. The trousers and the close-fitting garment owe their origin to such a physical condition. If the region is hot much of the year, the *need* of clothing is by so much reduced, and the institution of dress is more largely based on the purpose of adornment. The flowing robe, the skirt, and the shawl have their origin here.

In our western civilization we have inherited from both these sources. The conservative and leisure classes retain the display garments, and the workers keep style in dress much more close to the needs of the case. The court, the church, and female society still carry the garb of leisure and of low-latitude arid lands, even into geographic environments where the retention of the style is a serious handicap and the occasion of much suffering. Here is a case of maladjustment to physical environment that flaunts itself in the face of the law of the survival of the fittest — a case where a social surplus is frittered away in useless friction with the physical environment, and energy is lost which might, if applied wisely, lift society and further civilization.

6. *Shelter — architecture.*— The need of rapid transit in following the deer reacts strongly upon the size and quality of the residence. Necessity requires a small shelter, and of light material, which can be quickly taken down and moved, and as quickly set up as need arises. The materials convenient for such purposes are poles and skins. So the tepee is a perfectly natural response to the conditions. All our tribes on the great plains had made almost a perfect adjustment along these lines when Europeans came. In the pastoral phase, woven stuff adds to variety of building materials, hence of the capacity of the abode, and so invites progress. The Tatar and Kurd have solved this problem.

When agriculture is established, the need for moving the abode does not arise. The dwelling becomes static, and so may be made of a larger variety of materials. The size is not limited nor the weight, so wood may enter more largely into construction, and as in arid lands even wood may not be plenty, sods or stones or baked clay become the building materials. So a massive construction is established because of the nature of the most convenient materials. The sun's heat is the discomfort most necessary to counteract; hence the walls grow thick. There is little rain to be shed; so the roofs become flat, and a type of architecture is evolved. The Pueblos show as a primitive phase, the Egyptians a well-differentiated style, and the Greeks a style which is perfection. But each one of them carries in every lineament the record of a climatic condition of origin. Contrast these styles of architecture of the arid lands with the Gothic, which is an evolution of the tepee adapted to a humid clime.

7. *Use of metals.*— The presence or absence of metals in a realm has a powerful bearing on the social and economic possibilities of a people. The race very probably came to the use of the metals through finding native copper. There was a copper age, which grew gradually into a bronze age; and much later, with the accumulation of wisdom in metallurgy, iron came into use. But no people could come into the use of metal without having the metals to call on. They could have developed never so wisely in all lines, but without copper or iron they would have

so serious a handicap as to make a high grade of culture out of the question. There are many coral isles in the Pacific with quite as high a culture as we could ask without the possession of the metals. Even after a high civilization is established the presence of coal and iron confers so powerful an advantage as to make their possessors great, willy nilly. Our Pueblos had the handicap of having no metals — a very serious bar against progress.

8. *Industrial arts and mechanical invention.*— Here again we are forced to see that the nature of the materials at hand shapes the possibilities in the way of progress in the long list of inventions. The origin of pottery seems closely connected with a life in arid conditions. Water is a prime necessity. It must be kept on hand. The skins of animals are convenient, but they are short-lived, and there are other obvious disadvantages. A basket lined with clay will hold water, and such a dish burned is pottery. In any case, the inventions which may be made depend upon the particular combination of the elements of the physical environment. The savage in England would make his bow of a single piece of yew. The Eskimo, lacking yew, must use his wit, and get a compound bow of bone and sinew — a work of high art.

9. *Forms of government.*— The form of government grows out of the family organization and the way in which the daily bread is won. On the arid plain the strong hunter or the powerful warrior is chief. The whole life is one of the chase and the conquest of a weaker foe. It is not a long step from the hunting of the buffalo to the hunting of an enemy in the adjoining tribe. The arid realm breeds warriors and robbers — and might is right. In a pastoral society the family *is* the state, in origin, and the father is the head of the government. Conditions are only slightly changed. Women are slaves and inferiors, and any evolution in government from such a foundation will end in the establishment of a hierarchy of rank, with the strongest in the highest places. It is not different in any way from the rule of the barnyard among horned cattle. It is not a question of wisdom or right, but a question of brawn. Such a basis leads to the establishment of aristocracy, which, long planted and gone to

seed, gives us the caste system in India. The culmination of all such government is the absolute monarchy, which is, in every instance, in last analysis, a military despotism.

Agriculture and the industrial arts tend to equality among workers, male and female. The tendency is to make the wise man the leader. The whole trend of such a foundation is toward democracy. Our western civilization is in constant swing between these two great tendencies, the one of which we inherit from the arid orient, the other from the agricultural lands of western Europe. And again, the Pueblos show us a primitive form of government, with the agricultural influence uppermost.

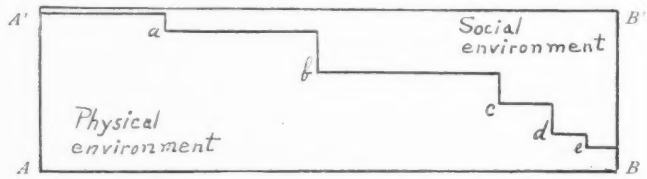
10. *Religion — social customs.*— The military organization dominates in religious establishment. In a military society the religious ideals are cast in the same mold. There is the same hierarchy, and every individual is given his station, with emphasis on obedience to the higher power. The supreme deity is the great war leader — the God of Hosts. We borrow this phase of our religion from the arid plains of the Orient. Even our hell and heaven are creations from the experiences born of a life in the hot desert and the delightful oasis.

But the practice of agriculture focuses the attention, not on a mighty conqueror, but upon the clouds. The crops depend upon the sun and the rain, and life and happiness depend upon the crops. Interest is focused on the return of the sun and the coming of the rain or the flood. This builds up a very different religion, which looks for the powers above us, in the sun and in the sky, and leads easily to the conception of the unknown god who rules the winds and brings the rains, and who lives in the sky. And these are elements found in the religion of every agricultural people settled in arid lands: Pueblo, Inca, Persian, Arabian, Hebrew.

RÉSUMÉ.

Human development, physical and social, is, at the start, unconscious, a direct response to the conditions of the physical environment — a cosmic process. But the psychic, social element enters, and the experience of the race is gradually capitalized in the form of social institutions and conventions. These become

forces competent to shape further progress, but they are clearly secondary, depending for initiation and for direction upon the conditions of the physical environment. Progress in social evolution is a record of a changing ratio between the influence of the physical environment and this growing social environment. This changing ratio shows a growing independence of the physical environment on the part of man, even a domination over it. It may be represented graphically by a parallelogram, the length of which, *AB*, stands for the lapse of ages occupied by human evolution, and this may be four or five million years, if we may



dare try to convert geological ages to years. The vertical ordinates *AA'*, *BB'*, represent in the terminal epochs the sum total of the forces in our environment, both physical and social, and may be most easily thought of in percentage, up to 100, at the top line. With the *Homo alalus* the social environment was at a minimum, almost zero; the physical environment essentially 100 per cent. On the invention of language (*a*) a sudden access of social power makes a large conquest over the physical control. With the discovery of fire (*b*) another conquest over nature changes the ratio, reducing the control of the physical environment. Agriculture (*c*), domestication of beasts of burden (*d*), and every useful discovery or invention, mechanical or social, have changed the ratio, giving us added dominion over the elements of our physical environment. But we can never reduce this environment to zero. Be we never so wise and ingenious, we shall always be directed, and the course of our evolution will be conditioned by its elements. These forces may be unseen, but they are nevertheless potent, and they are eternal.

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ASTRO-GEOGRAPHY IN THE GRADES.

THE writer of this paper is prepared to hear the reader promptly object to its high-sounding caption. Astro-geography to be seriously considered as a subject for study in the grades! Then he imagines he hears the mental shock relieved with the remark: "Well, I suppose he wanted to write an article for a magazine, and he must have a novel title at least."

But let us pursue the matter a little farther. Is the title so malapropos as it seems on first thought? The reader will hardly deny us the favor of reading far enough into our paper to find out at least what is meant by its title. What meaning can there be in the phrase "Astro-geography in the grades"?

Let me begin the answer to this question in the good old Yankee fashion of asking another. What is the meaning of "geography in the grades"? Are we seeking to secure only the informational value to the pupil of a body of more or less disjointed facts for his possible future use as a guide in travel, in raising crops, or in judging whether when he starts on a walk he would better take his umbrella along? Or should the geography teacher rather be seeking to establish points of contact between the life of the pupil and the laws of such natural phenomena as hem him in and are capable of being set into orderly array by him? Have we gone so far in our pedagogical rage to harmonize the successive appearance of the mental faculties with the several grades of our artificial school system as to deny to the student below the age of ten the possession of rational faculties even in a weak degree? If so, the sooner we stop theorizing and look at the child, the better for our pedagogy. Some would have us believe that it is not until after the much-talked-of adolescent period that the student really begins his rational existence. This paper proceeds upon the view that a pedagogy based upon the study of segments of child-life made between *transverse* sections is a poor pedagogy. It assumes the gradual growth and decay of the mental powers in the individual from the first day of existence

to the last. In other words, it is held that, if we must treat the life of the learner by sections, the *longitudinal* section reveals a truer state of things for the teacher.

Too much is often made of observation as an end in itself. Evidence has long been sufficiently plentiful that the training of the observing faculties is impossible without due regard to the necessity of interpreting the meaning of the observations. Most of us fall short, not in failing to observe, but in failing to observe intelligently. Observations uninterpreted are always blind and pointless. It is no less true of children than of adults that observation, to be educative, must be rational. The emphasis of this paper is, accordingly, that especial attention be given to having the children draw their own inferences from their observations. The sort of work called for below will be valuable only in the degree in which it trains pupils both to observe and to reason on their observations.

To give the pupil the proper foundation of ideas on which to erect his edifice of geographical knowledge, it is necessary that he be led very early to grapple with some pretty broad conceptions. His home region is, of course, his starting-point, and only his starting-point, in the formation of his conceptions. To confine his geographical knowledge too long to his direct experiences in his home region is to shorten his perspective and to render difficult his conception of the earth as a whole. He must very soon leave the local environment and launch out upon the broad expanse of the vastly greater part of the earth's surface which he can never expect to see directly, but which his local experiences enable him to see with "his mind's eye." In other words, the conception of the earth as a whole, and even the more difficult conception of the earth as a member of the planetary system, should be introduced very early into the study of elementary geography. The gradual transition from local and necessarily short-sighted notions of the appearances of near objects on the earth can be easily made by directing the pupil's observation to the appearances of remote objects and of the landscape from sky-line to sky-line, and thence to the appearance of the moon and of the sun. The interpretation of these appearances must needs

be assisted by the aid of globes illuminated under various conditions in the schoolroom. No better work can be done by a very elementary geography class than to spend enough time observing the appearance of the moon and its position from evening to evening among the stars, to trace the obvious changes through an entire lunation. Crude sketches of the phases, and light and dark shadings, of the lunar face, including two or three of the brighter neighboring stars, can be made by very young pupils with very little assistance, by merely directing their attention successively to the desired features. The writer has seen a group of ten-year-olds enthusiastically engaged in such work on the moon, and in similar work on Venus, from evening to evening, during the summer months for two weeks. They were veritable little astronomers, investigating at first-hand phenomena which would have made many an adult scientist blush for his lack of interest and intelligence in such matters. One could easily imagine the exultance of spirit with which they seized upon the discoveries brought out by the comparison of their crude little working sketches from night to night, as not unlike that "divine intoxication" with which the great astronomers of the past have trembled as they approached the sacred presence of new discoveries. Who that has seen the enthusiasm of these embryo scientists can doubt the educational genuineness of the effort thus put forth? The difficulty in doing such work in the schools is either imaginary or is due to the mental passivity into which teachers have trained themselves by long-continued ignoring of the great truths which lie under their immediate ken. The freshness of spirit and open-mindedness to truth of the boys and girls who have not yet learned how to conceal or stifle their enthusiasm at the first-hand discovery of new truth will be both a revelation and in some instances a mortification to grown-up folk.

By the aid of a couple of sticks and the law of simple proportion — which law may be better taught in this way than is done in the texts — the pupil may measure for himself the actual diameter of the moon, if the teacher will give him its distance. For a simple form of solution of this problem the teacher is referred to the *Rational Grammar School Arithmetic.* (Problem

17, p. 199.) When the pupil has found from his own measures that the diameter of the moon is over two thousand miles, that it looks round, and is visibly spotted with light and dark shadings, it is much easier for him to form an adequate conception of an earth eight thousand miles in diameter, spotted over with seas and continents. An opera glass will aid materially in impressing the student with the roundness of the lunar globe and with the spottedness of its surface.

Again, after the pupil has followed from evening to evening, or at intervals of only a few evenings, the slow eastward creeping of the moon among the stars, pretty well through a complete lunation, he will have picked up many ideas incidentally which will later be most valuable to him in his work in geography and in nature study, and which will afford him a source of genuine pleasure all his life. He will, if the cause of the observed changes of phase is cleared up for him by the aid of an illuminated globe and an artificial sun, never fall into the popular confusion as to whether the horns of the moon should point from or toward the sun, as to whether the new moon rises in the east or in the west, and as to the meaning of "the old moon in the new moon's arms." If such study is followed at intervals throughout a year, the pupil will learn much about the path of the moon through the stars; will become impressed with the reality of the movements of heavenly bodies — among them the earth; will learn something about the constellations; and under an intelligent teacher may learn to recognize for himself the principal planets both by their appearance and by their visible movements, and may fix in mind the slow westward drift, with the seasons, of the rising constellations. This much observational work on the moon is both feasible and immensely important for pupils from Grades IV to VIII. The only practical difficulty is in getting teachers who feel its importance sufficiently to keep it up systematically without overworking it at any point along the specified interval.

It will at once be objected, even by those who admit the importance of this work, that pupils cannot be gotten to do the observing; that classes of pupils of this age cannot be brought together under the open evening sky with their teachers; and

that the observational work without the teacher would be little better than worthless. These are the staple objections that one always hears. They are nevertheless not valid, even if they have become classical among elementary teachers. Ten or fifteen minutes is enough time for the pupil to give to this observational work for one evening. The more the pupil does without assistance the better. A line or two from the teacher to the parents, directing them as to what observation is wanted, will in most cases secure all the co-operation the teacher needs. The kind of observation, however, which is most valuable, and in which the student should be trained, is independent observation. Very much assistance from the parents is positively harmful. The pupil will bring his notebook to the class the next day, and his work will be gone over with the same care and consideration as should be bestowed on any of the other assigned work.

Nor is this work new. It is, however, not done so extensively as it ought to be. The testimony of those who have tried it is to the effect that the teacher's idea that it is difficult to teach it, as also the pupil's feeling that the observing is difficult, are entirely dissipated by the first attempts at doing it. Miss Eliza A. Bowen, a pioneer and hearty advocate of the sort of observational work here recommended, has prepared an excellent text for the guidance of high-school classes in such work as this. No better idea of the *spirit* of such work can be given than by recommending all interested to study Miss Bowen's text, *Astronomy by Observation.* For grade classes, of course, the plans of this book must be greatly simplified; but this will offer no special difficulty. The four large maps given in Miss Bowen's book, and her suggestion that constellations be always identified by certain geometrical or other familiar forms, suggested by groupings of a few bright stars within the constellation, are directly pertinent to grade work. The following outline will suggest the subject-matter which can and should be studied by direct observation by pupils from Grades IV or V to VIII.

A few nights (four or five) during fortnightly periods should be spent in making notebook records of observational studies and in discussions upon them of the objects given under each of the

following heads. The teacher will be greatly guided by Miss Bowen's text, published by the American Book Co., which contains the greatest amount of usable material of any elementary book yet in print. Upton's *Star Atlas* will also be found serviceable. It must be remembered that the object of the work is to teach pupils both to observe and to think. One or two constellations an evening is sufficient.

1. Fundamental constellations: (*a*) the Great Bear (large dipper); (*b*) the Lesser Bear (Polaris); (*c*) Queen Cassiopeia's Chair; (*d*) the Lyre (Vega); (*e*) the Northern Crown (Arcturus).

2. The zodiacal constellations of September: (*a*) the Virgin (Spica); (*b*) the Scales; (*c*) the Scorpion (Antares); (*d*) the Archer (little dipper); (*e*) the Goat; (*f*) the Fishes.

3. The Milky Way or Galaxy and solstice: (*a*) its position and place; (*b*) its form; (*c*) its brightness; (*d*) location among stars of winter solstice.

4. The zodiacal constellations of November: (*a*) the Fishes; (*b*) the Ram; (*c*) the Bull; (*d*) the Twins (Castor and Pollux).

5. Other constellations and objects of November sky: (*a*) the great square in Pegasus; (*b*) Andromid and Orion nebulæ; (*c*) visible planets; (*d*) moon; (*e*) location among stars of the vernal equinox.

6. Zodiacal and other constellations of February sky: (*a*) the Goat; (*b*) the Water-Bearer; (*c*) the Fishes; (*d*) the Ram; (*e*) the Bull; (*f*) the Twins; (*g*) the Lion (Regulus).

7. The Galaxy and its principal constellations.

8. The constellations of the April sky.

It is impossible to fix a program rigidly for work upon the planets. They must be "taken as they come." But, leaving the work informal, the following facts may easily be gotten at by a little patience and perseverance:

1. Their difference in appearance from the stars.

2. Their brightness as compared with neighboring bright stars.

3. Their differences of color.

4. Their positions with reference to bright stars, estimated and recorded in direction (north — toward Polaris) and in terms of the distance (5°) between "the pointers."

5. Their paths mapped on small globes suitably provided with parallels of latitude and meridians of longitude.

6. Their movements with respect to the sun.

7. Their appearances in an opera glass described and read up in a simple text (Holden's *Astronomy*).

8. Comparative study of the earth as one of the planets; changes observed on the sky caused by earth's diurnal and annual motions being pointed out.

9. Relations of a planet and sun studied with an illuminated model.
10. Study of pictures of planets with lantern where possible.

Much is made nowadays of fairy-stories and classical myths in the elementary schools. Some of the finest mythology ever produced centers around the constellations. Literary references to these myths are frequent. Often have they been made "to point a moral or adorn a tale." Why not make much more of these myths with the very early grades than we do? In addition to their intrinsic beauty, these classical myths have a historical value and will become a permanently useful possession to the children. Let us make more of them!

In the later grades the observational work should become more distinctively *quantitative* in character. Such measurements as are set forth in the pamphlet given at the head of the list of references below may be used to correlate with the grade geometry. Work on the sun such as is outlined in Jackman's *Number Work in Nature Study* should also be made a feature of the seventh- and eighth-grade work.

The list of references here added will serve to put the reader in touch with what has been and is being done along the lines here outlined:

REFERENCE BOOKS.

1. G. W. Myers, *Elementary Experiments in Observational Astronomy.* Chicago: School Science Press.
2. W. S. Jackman, *Number Work in Nature Study.* Chicago: Flanagan
3. Mary Proctor, *Stories of Starland.* Potter & Putnam Co.
4. R. S. Ball, *Starland.* Ginn & Co.
5. E. S. Holden, *The Family of the Sun.* D. Appleton.
6. Parker, *Familiar Talks on Astronomy.* A. C. McClurg & Co.
7. Young, *Uranography.* Ginn & Co.
8. Young, *Lessons in Astronomy.* Ginn & Co.
9. Eliza A. Bowen, *Astronomy by Observation.* American Book Co.
10. Gregory, *The Planet Earth.* Macmillan & Co.
11. Durham, *Astronomy, Sun, Moon and Stars.* Adam & Charles Block.
12. Winslow Upton, *Stars Atlas.* Ginn & Co.
13. E. P. Jackson, *Astronomical Geography.* D. C. Heath & Co.
14. E. R. E. Cowell, *Curiosities of Latitude and Longitude.* Chicago: Thos. Charles & Co.

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ASTRO-GEOGRAPHY FOR CHILDREN.

WHILE the members of a class were discussing plans for a year's work on the history of Chicago, the children brought out the reason for the original settlement of the city at the mouth of the river on the lake. After talking over the river as the open way to the fur trader's country and the character of the surrounding region, a small boy of eight very seriously propounded the following problem, over which he had evidently spent much thought: "Which do you think," said he, "is the best way to study geography — to begin with your own place and go out, out, out, until you reach the stars, or to begin with the stars and come in and in until you reach your own place again?" Upon being told that people differ as to the wisdom of either course, and reminded that during the previous year he had studied about people who lived in very different parts of the earth, and was now to study about his own locality, he accepted the answer, satisfied to begin at home; but, while settling back contentedly, murmured: "But I shall get a book about the stars, anyway."

This story may indicate an unusual state of mind in an eight-year-old child, but, contrary to opinion, children between eight and nine take such universal views much oftener than they are given credit for so doing. The title "astro-geography" has but little meaning save as an occasionally convenient division in science for the teacher's grouping of work to be done with children under twelve.

Many of the fundamental conceptions of this same "astro-geography" kept in the teacher's mind may help in forming in the child's mind a background of feeling and interest, out of which will develop these same conceptions later on in his life, though at the time they may seem as far off from the work that he is actually carrying on as the boy's story about the stars was from Chicago geography.

The city child has so much of people, so many activities, that his naïve attitude of wonder and delight in the heavenly bodies

dies still-born, unless the organization that school and home can effect give him chance for development of that genuine interest in the marvels of the countless stars and immense distances of space which only the leisure of early youth can afford.

In the child's mind is still inherent that plasticity which makes possible the use of material that seems to the ordinary adult mind abstract, too remote to be suggestive.

A child aged eight or ten has no fear of any subject, no habit of regarding one problem as more difficult than another, because of association. Points in astro-geography, as in physiography, which take an hour's work with college students will be worked out by children in fifteen minutes. It is especially in this topic with older students that we find it more difficult to overcome the paralyzing feeling that the subject is abstruse, than to solve the real problem. The average teacher will grant that a child can use angular measure in making a clock face, when this same teacher might hesitate to go on and apply the method in getting the altitude of a star, or in attacking the subject of latitude or longitude.

With very young children. when occasion arises for their noting marked changes of length of day and night, and of season, by reference to the causes of these changes, made in a story form, the teacher can keep the ideas plastic and open to the larger universal element, although he may be occupied at the time with small results of the same changes, such as autumn fruits, the winter ice and snow, planting of his garden, or the return of the birds in the spring.

Seven-year-old children begin to ask definitely for the story of the earth; and here again, in connection with something they are carrying on — their gardening, or any other occupation — can be introduced the same story of the seasons, the explanation of the moon's phases, why only the north star seems stationary, and stories to identify others of the guiding stars of the heavens. By the use of globes and strong light, a real appreciation of the reason for the changing phases of the moon which the child sees each month may be easily attained, as well as the periodic recurrence of the eclipses; although, of course, the working out in

detail of the definite position of the moon with relation to the sun and earth, which results in the different phases, might better be left until two or three years later. It has been found that the child will learn to look for the full moon rising in the east, as the sun disappears in the west, and associate that eastern position with its relation to the sun. In a graduate class in the University a professor of Greek was astonished to find that only one in his class knew where the full moon rose. This one student afterward confessed the only reason for her knowledge was that she had heard an explanation made on that day to a seven-year-old boy at home. So much of the history of past peoples and their literature is bound up with the sun, moon, stars, and the wonder of the nightly heavens, that one would question an education which, recognizing that city life now has no actual need, such as existed of old, for such knowledge, would ignore the fact that this experience must come to the child through the co-operation of the school and the home.

The equinoxes, the shortest and the longest day, are occasions to be utilized year after year to bring about a growing definiteness of idea in the child's mind of the earth's position in the solar system. The events which effectively seize on the child's imagination are the meteoric showers, the press-heralded comet, the nebulæ, and the riddle of the double star.

The amount that can be done with such topics as geographical position upon the earth, as determined by time and the altitude of the stars and sun, thus giving latitude and longitude a *raison d'être,* depends upon the background the children already possess from their previous experiences. As an illustration of what can be done when the child, through his imagination, realizes the need for a means of determining geographical position, and actually constructs a primitive method of determining the same, the following report may be of value:

The children of nine or ten who carried through this work were getting some idea of that enlargement of the known world which took place after the discovery of America, just before the beginning of the colonization period. They had had the voyages of Hawkins and Drake as introductory to the settlement of Vir-

ginia. Through the voyages of these navigators they had gained some appreciation of the necessity for a means of locating the position of newly discovered lands, as well as the need of the navigator to keep his bearings. Starting from their own sailing experiences, it was found that they had a vivid idea of sailing by points on the coast, and an appreciation of the reason why the compassless sailor hugged the shore of the continent. With the help of the compass they at first thought that the problem of sailing in a certain direction was entirely solved, but when they found that the distance north and south was as important as direction, they came up against the problem which had determined the invention of the astrolabe, or primitive quadrant and sextant. By imagining they were in typical positions upon the earth, and that the sun was on the sky's equator, they could see that, as a man traveled north from the earth's equator, the noonday sun would be lower and lower in the sky; also that the pole star at night would rise to a higher point with each northward advance, until the star was in the zenith at the pole. With the help of a globe and strings, the fact was shown them that the distance of the sun from the zenith was the same as the angle of latitude at the center of the earth, if measured in degrees on the surface of the earth, or to the latitude of the observer. This relation of the angles is easily seen intuitively. They went to work to make some instrument which would give them a ready way of finding the sun's angle or height in degrees on the horizon plane. The result was worked out in combination, each child making a form of the astrolabe where the sun's ray was received through a tube or circle. The circle of light falling on a piece of paper at the end of the tube gave a means for determining the exact angle by the pointer carried under the tube. The children were then given the correction, or the declination of the sun for that day, and by subtracting the sum of the declination and observation angles from ninety degrees they obtained the latitude of Chicago to within two-fifths degrees. The construction was the result of a long series of steps which lasted through several weeks of daily periods of an hour in length — which implies the development

of an idea of angular measurement in the clock, compass and hour circles on the earth.

They then applied this method of locating one or two points in Drake's voyages, in which they had been especially interested, such as the Canary Islands, Cape Verde Islands, the coast of Virginia. They again used their latitude and longitude in a comparison of their own position with that of the Virginia colonists with reference to the difference in the severity of the winter in Virginia. They applied this again in a restatement of the zonal distribution of life on the globe with reference to their previous year's work. The need for selection of a prime meridian seemed to follow logically from the use they had made of the equator in reckoning latitude.

In such work as the above the interest in the problem and appreciation of its importance lay entirely in the relation to the voyages and discoveries which they were following, and could never be undertaken aside from such realization of its necessity. The interest in their own activity in meeting the successive difficulties in construction deepens the interest, somewhat vague and indefinite, with which they start out, while the interest in getting their observation "right" helps them realize the four or five conditions which must be met in taking even so simple an observation as this. In this way such work would seem to fulfil requirements which demand recognition of a problem, hence initiation on the child's part, and utilization by him of means suggested by the teacher to obtain an end which he appreciates. With older children, from ten to thirteen, such points can be worked out as are involved in the construction of a sun dial, of the day circle, the mapping of the chief constellations, and the working out of such a model of the solar system as is suggested in Iles's *Intuitive Geometry,* where a child, after walking blocks to place his various planets, begins to get a faint realization of the enormous distances involved in our own small planetary system. To solve through constructive geometry the problem of finding latitude from altitude of the sun or pole star is a problem which interests and demands all the powers of a thirteen-year-old child, especially when applied in the construction of the sun dial. That

the child's mind is fascinated by contemplation of the great distances and by the possibilities for imaginative construction of conditions, which can be found in a study of the solar system, with its history as given in the various hypotheses of formation, has been found as true as the most enthusiastic astronomer could desire.

The main ideas of the earth as one planet in a system, of our seasons as due to the inclined axis which makes the change in direction of sunlight and relative length of day and night, may be made more telling if considered by the child, not only as changes which affect his immediate surroundings, and also the remote quarters of this globe, but as related to similar changes in the sister-planets, Mars or Venus. In the same way the idea of the motions of our satellite, if compared with the motions of other satellites, as well as connected with its varying phases as seen by the child, will gain distinctness of conception. The theories of the formation of the earth as a part of a nebulæ, once like others which can be seen today, should be repeated from year to year as affording a most important and clear illustration of the way in which scientific theories are formed, only to be replaced by others, and helps to do away with the tendency to regard a natural law as arbitrary.

If each time that such a topic is used with children it is so connected with some appreciation of the problem which gave rise to its first consideration, and the problem is elaborated through the construction by the child of some apparatus which he can in part invent, the danger of abstractness cannot be urged. Indications furnished by various experiments seem to indicate that the period just before the secondary school, before the pressure of college requirements is felt, would be the time to give an organized summary of these main conceptions of the oldest of sciences, astronomy, in close connection with one of the newest, geography.

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GRAPHIC REPRESENTATION IN GEOGRAPHY.

I.

GEOGRAPHY as taught in the schools today, and as presented in our modern text-books, is almost a new subject. One of the features of the so-called new geography is the prominence given to relief and to the various landscape forms. The surface of the land — that is, the relation of high lands to low lands — is more and more understood to be the key that opens up to the child the whole fascinating subject of geography.

To the children of twenty or thirty years ago the earth must have appeared flat, with a great number of cities scattered about promiscuously and with rivers flowing in all directions. Geography meant a memorizing of the peculiar shapes which this flat land surface assumes in various parts of the earth, and of cities, rivers, and mountain ranges which were distributed without definite relation to the surface itself. Mountain ranges were named, but the child rarely had anything in mind except the caterpillar-like representation of these features on the map. That the land sloped in a certain direction, that a combination of slopes determined the drainage of a country, and that rivers flowed in the valleys; that the coast line presented an infinite variety of form; and that cities and rivers sustained a relation to the surface of the land: that the relief of land to a large extent has determined the history of our country and is shaping its destiny today — these fundamental conceptions did not enter into the geography teaching of a few years ago.

The best means by which a teacher could test the knowledge of her pupils was the outline map. And, according to the condition of geographic study of that time, the outline map had a legitimate place. Through it the child could express his knowledge of a country; the outline was given often with minute details, dots were placed for cities, lines for rivers, and different devices for the representation of mountain ranges. The outline map was almost symbolic of the mental poverty which was the

result of teaching that did not relate geographic facts to the surface of the land.

But, in spite of the fact that physiography, the study of land forms, has revolutionized the teaching of geography, outline maps are still used in our schools. The subject-matter of geography has been enriched, but still the means by which the child is expected to express his geographic knowledge remains the same.

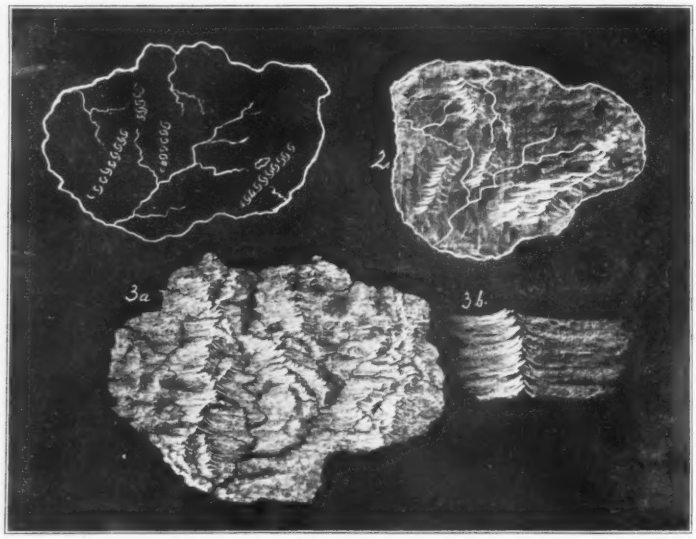
The study of relief, of slopes, river basins, highlands, and lowlands, is a study of form. An adequate expression of such features must, therefore, be through a medium that will express form. Sand and clay are such mediums, and also chalk used on the blackboard. This must not be construed to mean that the outline of a country should receive no attention; it should receive attention, but not exclusively. The outline taken by itself is of little value; it is, in fact, but a frame with the picture left out. Only when the outline suggests to the child the outer edge of the surface of the land, where this sinks below the level of the sea, does it become of importance. The land surface itself, and not its edge, is the great factor in geographic study. If the child knows the direction of the great continental divides, of the highlands and lowlands, the outline will take care of itself, as it is, after all, only the horizontal limits of the solid land surface above the level of the sea.

Of the two mediums sand and clay, sand is by far the more satisfactory in the schoolroom. Sand-modeling should precede chalk-modeling (chalk-relief on the board). As a medium of expressing form, sand is very plastic, and mistakes are easily corrected. Questions of perspective, of light and shade, are entirely eliminated in sand-modeling, while these questions must be considered and understood in the representation of land forms on the board. The child's desire to model in sand is spontaneous and needs no encouragement from the teacher. If the child has modeled mountains, valleys, plateaus, etc., in sand, the representation of these features on paper or on the board becomes an easy matter.

Like sand-modeling, chalk-modeling is a mode of representing relief or surface forms. A series of attempts were made

in the Cook County Normal School, under the direction of the late Colonel Parker, to devise a means that would enable the teacher and pupil to represent forms of land and water on the board, as it was felt that the outline map did not bring out the important facts of the geography of a country.

Figs. 1, 2, and 3 show the development and final result of these attempts. Fig. 1 is the outline map; in Fig. 2 the outline



FIGS. 1, 2, 3*a*, 3*b*.

was first made and the land filled in afterward. The mountains and rivers were superimposed on the flat surface. In Fig. 3 the highlands were put in first, and then the lowlands as a continuation of the slopes from the highlands, the outline was omitted as being unnecessary.

In the chalk-modeled relief map, as it finally appeared, are shown:

1. The real elevation above the lowlands in the representation of hills, mountains, plateaus.

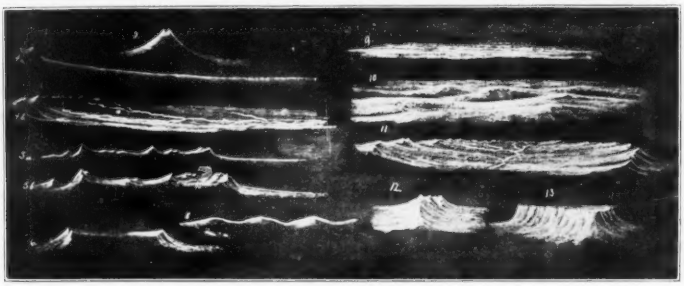
2. Slopes and combination of slopes into river basins, involving the whole system of drainage.

3. The appearance of the country as a land mass, the edge of which is the outline.

4. The unity of the surface; that is, the intimate relationship between highlands and lowlands.

In Fig. 2, with elevations on a flat surface, points 2 and 4 were not brought out.

It must always be borne in mind that the chalk-modeled map, as here shown, is but a device for the representation of relief, and as such it is being modified all the time. The elevations are conventionalized and exaggerated.



FIGS. 4*a*–13.

In order to be of real value to the child, the relief map should be preceded by years of close study and modeling of those land features a combination of which constitutes a continent. The relief map may then be taken up in the fourth or fifth grade; if the previous work has been done conscientiously, it will not present great difficulties, as it is in reality but á conventionalized presentation of landscape features on a small scale.

The relief map made by the child should be an expression of his knowledge and feeling of a certain land surface; as such it should show individuality and personal interpretation. It will therefore be different from that of his teacher or from those of his schoolmates. A relief map, if copied, is worse than useless.

In making the map it is important that the child should begin with the highest parts of the land — that is, the divides — and proceed from them to the lowlands (see Fig. 3*b*). Only in this way

will the unity of the surface be maintained. If a flat surface is made first and the mountains put in afterward, a distinct separation between highlands and lowlands will be the result, and the contrast in color necessary for representation of relief cannot be given.

The only purpose of the chalk-modeled relief is to convey a broad, general impression of the surface conditions (structure) of a country; only the essential, characteristic features should therefore be shown. In the map of South America these great characteristics of the country should find an expression (see Fig. 21):

1. South America as a great land mass projecting above the surface of the sea. The general shape of the continent.

2. The continuity, unbroken character, and elevation of the western mountain system. The precipitous descent, and the absence of a coastal plain along the Pacific.

3. The high plateau of Titicaca.

4. The eastern highland systems. The broken, irregular, discontinuous character of these highlands, and their comparative low elevation.

5. The great central lowlands.

a) Gentle slope from the Atlantic to the foot of the Andes.

b) Division into three great river basins: (1) Orinoco, (2) Amazon, (3) La Plata.

c) The divides between these basins.

NOTE.—The map should be so made as to show that these rivers and their tributaries must flow in the direction in which they are flowing on account of a certain combination of slopes.

The general but characteristic picture that the relief map gives of the surface should provide the frame into which the child can place and arrange the multitudinous facts and details of geographic knowledge.

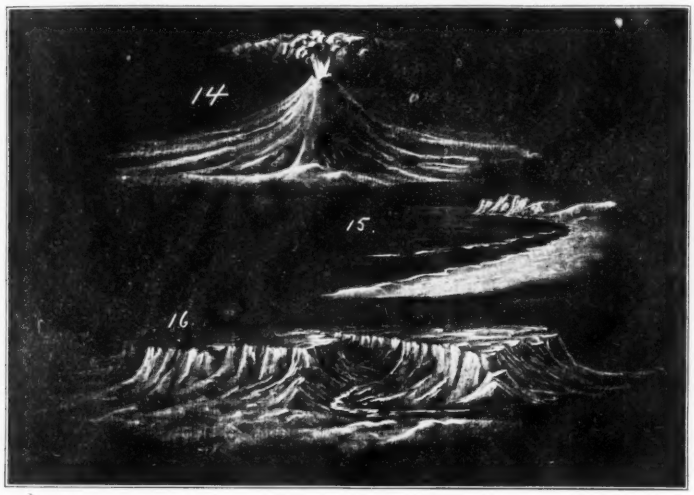
The relief map is a symbolic conventionalized representation of surface features and landscape forms. As a symbol it has no other function than to bring out in the child's mind pictures of the real country, and it should therefore not be used until the child is able to interpret its meaning in terms of landscape forms. The map cannot give the child the appearance of rivers, mountains, plains, etc.; the appearance of these features should have been studied previously through observation, pictures, and descriptions.

All that the map can do for the child is to give the extent and distribution of these features on the continent, thus organizing his previous experience of land forms.

In analyzing the map Fig. 21, the following should be noticed:

1. The light comes from the left. This is merely conventional.

2. The strong contrast in light between the two sides of the mountains. This contrast gives relief.



FIGS. 14–16.

3. The high light on the left side of the mountains, the shaded right side of the mountains, and the medium light on the plains.

4. Rivers, lakes, and coast line are shown with charcoal. These features should be represented white on paper.

5. More color is given to the more elevated parts of the land. This might be worked up according to a definite scale, and the coloring graded so as to show elevation.

6. Differences in the heights of mountains are shown.

In the representation of relief on the board (chalk-modeling) one point is essential — the slope of the surface. If the teacher can do no more than show the direction of the surface with a stroke or two, a great deal is gained. For this purpose the black-

board should be used continually by teacher and pupils. If, for instance, the western slope of the Mississippi is under discussion, and the teacher tries to bring out the gentle but steady rise of the land from the Mississippi to the foot of the Rocky mountains, a line extending across the entire length of the board will give this fact better than hours of talking (Fig. 4*a*). In the same manner the western plateaus, and their relation to the Pacific on the West and to the great plains on the East, may be shown in a line giving the direction of the surface (Fig. 5*a*). In a similar manner in

FIGS. 17–19.

Fig. 6 the combinations of surfaces in a plateau are shown; in Fig. 7, steep surfaces (mountains); in Fig. 8, rolling surface.

This graphic representation with single lines leads easily to a more complete representation of the surface; for instance, in Figs. 4*b* and 5*b*.

If the various landscape forms are analyzed, it will be seen that their different appearances are principally due to differences in the direction of their surface slopes. For instance, in the level country the horizontal direction predominates; in a cañon two steep surfaces meet a horizontal surface. Fig. 9 shows a level surface; Fig. 10, a rolling, undulating country; Fig. 11, gently sloping surfaces (river basins); Fig. 12, steeply sloping surfaces (mountains); Fig. 13, a steep surface (bluffs and cliffs); Fig. 14, concave surfaces ascending toward one point (volcano); Fig.

16, a combination of horizontal and vertical surfaces — buttes, mesas. By a combination of these surfaces an infinite variety of land forms may be represented: Fig. 19, cañon; Fig. 15, level and vertical surfaces (beach); Fig. 16, cañon in plateaus.

Chalk-modeling is a representation of mass, and lines should therefore be avoided, except where a detailed analysis of the surface is desired. The broad surface of the chalk should be used and only the essential features of the landscape emphasized.

Another essential point in the representation of surface is texture. Is the surface rocky or sandy, water or land, cultivated or uncultivated, are questions that must be answered. Figs. 15, 18, and 19 show surface or water, horizontal or vertical; Fig. 15 shows sandy surface; Fig. 17, surface of ice; Fig. 19, wooded surface; Fig. 16, rocky surface.

Chalk-modeling may be done on paper as well as on the board. On paper the best medium is charcoal or a very soft pencil. It must be borne in mind, however, that the medium used on the board is white and on paper dark, and that therefore the treatments on paper and on the board differ. It may perhaps be safe to make this general statement concerning the use of the two mediums: In the representation of white or

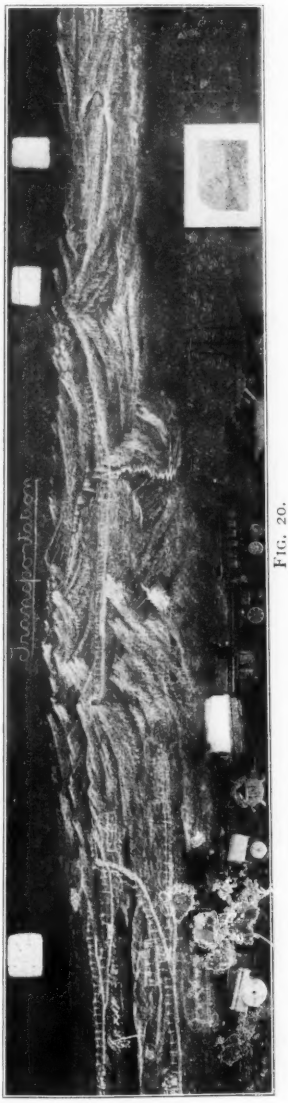


FIG. 20.

bright colors, or of light, the white material must be used. This on the paper is the paper itself, and on the board the chalk. For instance, in Fig. 14 the reflection from the molten interior is bright (white), and must be so shown, whether on paper or on

FIG. 21.

the board; similarly, the crests of the waves in Fig. 18, and the snow and ice in Fig. 17. To use here the dark material heavily on paper, as chalk is used on the board, would be to convey wrong ideas. Children will often make such mistakes. In Figs. 9, 10, and 11 the chalk is used more heavily in the foreground to convey distinctness (perspective); and the medium on paper would be used in a similar manner.

In Figs. 9-19 the landscape is shown as it would appear to an observer when looking in a definite direction from one fixed standpoint; this involves perspective. In the map, Fig. 21, the landscape is represented, not as it appears, but as it actually is; that is, perspective is largely eliminated. Fig. 20 is a bird's-eye view of a large section of the country; it is a combination of a picture and a map, in this, that perspective is shown, and that here a much larger stretch of country is sketched than can possibly be seen at one glance. The representation is conventionalized and exaggerated, but at the same time pictorial. As an aid in teaching geography such a bird's-eye view is extremely helpful for showing the relationship and combination of surface features. There is hardly any limit to the extent of surface that may be graphically shown in such a bird's-eye view; it may involve hundreds, even thousands, of miles. The sketch in Fig. 20 was used in connection with a study of transportation in the second grade. The teacher chalk-modeled the surface, and the children were asked to provide railway facilities for towns that were separated by a rough, mountainous country. The children surveyed the country to find the cheapest and best route for the railroad, and then put in the tracks, tunnels, bridges, etc.

The aim in chalk-modeling is not to make finished pictures nor to produce artistic effects, but to describe geographic features clearly, scientifically, and rapidly wtih the chalk. If this aim is held persistently in view, the result will be "art" as well as geography. Lack of artistic ability is no excuse for a failure to carry on this work in the class-room. What is needed on the part of both teacher and pupils is a definite knowledge of landscape forms and of relief, and a willingness to express this knowledge in an intelligible way.

II.

THE USE AND ORGANIZATION OF PICTURE COLLECTIONS.

The use of pictures in the schoolroom is of great importance. In giving the child vivid images in the various subjects of study, pictures are inferior only to actual observation. A good picture comes next to the real object; by its study more may be learned

about a topic in a few minutes than is possible by hours of book work. But in order to be of value for educational purposes, a picture should be properly studied, and should receive the same attention that is given to the printed page. A picture has a certain story to tell, but unless sufficient time is given, this will not be revealed to the observer. The children should be trained to read a picture as they do a book. They should be led to see that it is not a mere embellishment of the text in the book, but that it is of equal importance with the text. Thus studied, pictures will reinforce all the work of the schoolroom and become an important source of information.

A picture collection may be organized in every school, whether in the city or the country. Hardly any expenditure of money is necessary for this purpose, as the best pictures may sometimes be had free of charge. Every day valuable illustrations pass through our hands to be thrown away or forgotten. Our modern magazine is a storehouse of this kind of material, with its wealth of pictures illustrating every phase of geographic knowledge. Many of these pictures are large, admirably executed, and furnish just the illustrative material which would add life and interest to our teaching. Almost every household has bundles of old magazines, thrown away in some forgotten corner in the garret or the cellar. People are only too glad to get rid of them, and if the teacher would make an appeal to the pupils for old magazines, material with which to start a collection of pictures would come in rapidly. Some of these would be of slight value, but enough would be found to make the trouble worth while. Newspapers, in particular the Sunday editions, also contain excellent illustrative matter. Some of the foreign weeklies, German, English, and French, have very large pictures which, when mounted, are an acquisition for any collection.

Another source from which we may obtain pictures without cost is found in the advertising matter distributed by the different railways, as booklets, folders, and separate pictures. Some of this material is excellent and can be had in great abundance. By visiting the various railway offices a teacher may make a very important addition to her collection and obtain pictures illustrating, not only our own continent, but also foreign countries.

Thus if everybody contributes, teacher as well as pupil, a considerable number of pictures may be obtained within a very short time. Surprisingly large collections have been made in this way, and have proved of such value that the teachers, if deprived of their use, would be very much hampered in their work. In this case, as in so many others, the best educational material can be had free of charge, if the teacher is alert and willing to use that which is near at hand.

The next step in the organization of a collection is the mounting and classification of these pictures. The children will be glad to do the cutting and pasting. If money is not available, sufficient cardboard will usually be found in the school or may be brought by the children. Large pictures should be mounted separately, but smaller ones may be grouped together on the same chart. This grouping should be done according to a certain principle; for instance, pictures illustrative of lumbering may be placed together so as to be a graphic representation of the whole process from beginning to end. Charts illustrating the various industries may thus be worked out. Similarly pictures of a certain city, state, or country may form the material for various charts. This arrangement of small pictures on large pieces of cardboard has many advantages. Where one small picture by itself would mean very little, when grouped with others it reinforces each one in bringing out a certain idea or a certain story. In this way an almost endless variety of charts may be composed out of the heterogenous material brought in by the teacher and pupils.

These charts should be planned by the children and should be an outcome of their study. If artistically made, they meet two important requirements of schoolroom decoration: they are made by the children, and they reflect the work that is being carried on in the schoolroom. These charts should be kept, and will furnish excellent geographical material for the study of similar topics in the future.

Another suggestion may be given here for the mounting of small pictures. On a large outline map — for instance, of South America — made on cardboard, the small pictures might be placed so as to represent different sections of that continent. The

pictures when in place should form a continuous whole. This work requires care on the part of the children and a thorough knowledge of the country.

If mounted on separate pieces of cardboard, the pictures should be carefully classified according to subjects and topics. No definite classification is suggested; that one should be adopted which seems the most economical and convenient in a certain school. The pictures may be classified under the main heads of "Rivers," "Glaciers," "Industries," "Cities," etc. These may be further subdivided under various topics. They should then be labeled and marked in such a way that a glance is sufficient to determine what they represent and where they belong. Only one thing more is necessary to put the collection in working order — a number of large envelopes. These may easily be made by the children and labeled according to the character of the pictures they are to hold. It is hardly necessary to add that in the use of this collection, as finally organized, the same rules should be enforced that regulate a library.

If the teacher or the school has money for the purchase of pictures, catalogues should be obtained from the various firms which have begun to publish whole series for use in the schools. These series have been very carefully selected, are in all sizes, and sell at very low prices. (See Miss Chisholm's list below.)

To sum up: All that is necessary to organize a collection of this kind is to save the pictorial material that is usually thrown away, to interest the children in its collection, and to have it mounted and so classified as to be of the most effective and economical use in the schoolroom.

The complaint is often heard that the teachers are hampered in their teaching of geography by a lack of material. This complaint may have some justification, as far as books are concerned. As for maps and pictures, there need be no lack of material. The teacher should be able to make her own maps in addition to the meager supply of printed maps; with a knowledge of the country, and with a little practice in chalk-modeling, this is possible.

It has been the experience of the writer that in the school where the teachers work up their own material, that which has

been bought, often at a great expense to the school, is used to a very limited extent. The sand or chalk-modeled map made by the teacher to meet an immediate demand in the schoolroom is far superior to any map furnished from the outside, and the picture collection that has been gathered from all available sources, and that is being constantly enlarged by contributions from teachers and pupils, will be infinitely richer in numbers and variety than any series of pictures published by book companies.

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WHERE TO PROCURE PICTURES.

From the following list of addresses good pictures may be purchased:

The Detroit Photographic Co., Detroit, Mich.: 8x10 inches, 35 cents; larger sizes at different prices; catalogues of either American or foreign scenes, price 10 cents; stereoscopic slides, 40 cents each. All the pictures of the Detroit Co. are good. They are printed in colors. In the collection will be found pictures showing the topography, industries, architecture, and ethnology of India, Egypt, Italy, Spain, Switzerland, France, Norway, Sweden, Holland, Belgium, Germany, Great Britain, United States, Mexico, and other countries. They also carry the well-known W. H. Jackson plates of United States and Mexican scenery. These can be had in plain photographs as well as in colors.

Mr. Elgin R. Shepard, 2931 Portland avenue, Minneapolis, Minn., official photographer for the Great Northern Railroad: 9x11 inches, $1; slides, 40 cents; catalogues. These are very beautiful photographs and are mounted on good cards. The collection consists of views taken on and near the line of railroad, as well as a number of Alaskan scenes.

Mr. Davis, Honolulu, H. I.: 7x9 inches, 30 cents. Mr. Davis has many photographs of different sizes, varying in price according to the finish desired. This is a good collection of tropical pictures, showing the vegetation, the rice, sugar, coffee, and other industries, and containing also a fine selection of volcanic views.

K. Tammura, 2&16 Benton Dori, Itchome, Yokohama, Japan: Colored photographs; stereoscopic slides. Mr. Tamamura has one of the best collections of photographs of Japan, illustrating the country, its industries, architecture, and ethnology.

Libreria Spithover, 84 Piazza di Spagua, Rome, Italy: 8x10 inches. Photographs of scenery, architecture, and art.

G. Sommer & Figlio, Sargo Vittoria, Plazza Sommer, Naples, Italy:

8x10 inches, 20 cents each, $1.16 per dozen. A good selection of Italian and Swiss pictures, especially of Pompeii, Vesuvius, and surrounding district.

G. Brogi, Florence, Italy: 8x10 inches, 20 cents each. Pictures of the cathedrals, art, and history.

Alinari & Cook, Corso 137*a*, Rome, Italy: 8x10 inches, $1.16 per dozen. Topography of the country and art.

Charles Naya, Place S. Mark N 75-79, Venice, Italy: 8x10 inches, $1.16 per dozen. Venetian scenes, art, and architecture.

A. Beato, Luxor, Egypt: 7x11 inches, $1 per dozen; no catalogue. A very good collection, illustrating everything of interest in Egypt.

Aristote Rhomaides, I Place de la Constitution, Athens, Greece: 8x11 inches, 20 cents each. Views of Greece — ruins, monuments, art, and landscapes.

Thomas Paar, Darjelling, India: 7x8 inches, 85 cents per dozen; 8x10 inches, $1.20 per dozen; no catalogues. Mr. Paar will select and send photographs, if told what is required. His collection contains the best to be had in India.

A. Giraudon, 15 rue Bonaparte, Paris, France: 8x11 inches, 1 franc each. A large collection of art and architecture.

London Stereoscopic Co., Regent street, London, England: 7x11 inches, 36 cents each. English scenery, architecture, art, and industries.

Berlin Photographic Co., Unter den Linden 4*a*, Berlin, Germany: 7x10 inches, 36 cents; 15x19 inches, 72 cents. A very large collection of photographs, mostly of art.

Erdmann & Schanz, 4 Salcot Road, Bolingbroke Grove, London S. W., England: A large variety of pictures on all subjects.

M. Frankenstein, Vienna, Austria; Stengel & Markert, Dresden, Germany; and Wurthle & Sohn, Salzburg, Austria, all have good photographs of the mountainous districts of the southern part of Europe.

A. Briquet, City of Mexico, Mexico: Large collection of Mexican views.

When pictures are desired of any particular region, they may generally be had if one writes to the proprietors of the large hotels, who usually carry them for the convenience of their guests. Names of the reliable hotels can be obtained from guide-books, such as "Cook's Tours," etc.

The United States government now sends photographers with the surveying parties, and the cuts which appear in the reports may be obtained from the government department, at the bare cost of printing. These cuts vary in size and cost.

The Perry pictures (Boston, Mass.) of art, birds, trees, etc., are too well known to need any explanation.

Stereopticon slides can be had from the following places, in addition to those already mentioned:

Lévy et Fils, 25 rue Louis-le-Grand, Paris, France: Catalogues, sent on application, for almost every country in the world.

Farrar collections (Charles Farrar), Unity Building, Chicago, Ill.: Sets of slides arranged for topical study of countries and cities, with special reference to art and literature. A written description accompanies these slides.

Mr. E. R. Shepard, Minneapolis, Minn., mentioned before, has some on mining, harvesting, milling; price, 40 cents.

John H. Thurston, 50 Bromfield street, Boston, Mass., has slides illustrating nearly every country. Under the direction of the Boston Geography Society, Mr. Thurston has arranged several sets of educational slides. These comprise: rivers, young, mature, old, and underground; swamps; stratification; coastal plains; plains, prairies; mountains; volcanoes; weathering; shore lines, waves, and tides; islands; glaciers; meteorology; agriculture, lumber, cattle-raising; coal, cotton, silk, and fish.

Many of the railroads publish good pictures that may be had for little more than the cost of postage. The Boston & Maine Railroad, Boston, Mass., issues a series of six booklets, containing thirty-one pictures each, at a cost of 6 cents apiece. These are taken from photographs, and give mountain, river, coast, lake, and historical views of New England.

The Northern Pacific, Canadian Pacific, "Frisco Line," and many other railroads, issue booklets full of excellent material for the geography teacher. Some railroads publish monthly magazines — such as *Sunset*, San Francisco, Calif.— that give a splendid idea of the sections of our continent traversed by these lines.

ANNA CHISHOLM.

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ELEMENTARY FIELD WORK.

I.

ANY phase of school work referring to elementary education must be considered in terms of human development. Development, so far as understood, is the product of effort to satisfy individual needs, desires, curiosity, purpose.

In any organized process of elementary education there are three prime considerations: (1) the pupil, with his inherited organism and its possibilities, mental and physical, of development; (2) the teacher, with her realization of the developing possibilities of the human organism and her teaching ideal; (3) subject-matter, or the means and demands for individual action and effort in the developing or educating process.

The normal demands and opportunities for human effort and action, and hence the means for development, are found in the individual's immediate environment. This environment, although there are many points of intergradation and frequenty no sharp line of demarkation, may be divided into two great units: (1) that phase almost entirely dominated by man — the social environment; (2) that phase not dominated by man — the nature environment. In elementary education we might add a third — the schoolroom environment. Environment has always been a counteracting agency in formal elementary-school work, because of the tendency of the school to isolate the child from his true nature and social environment, and its interests, and confine him to the barren, narrow, and artificial environment of the classroom.

The needs, interests, and curiosities of the child in this broader, nature and social, environment are a part of his inherited legacy.[1] The things which excite his natural interests, quicken his pulse, and determine a full flow of blood to the entire nervous system — the absolute conditions for normal development — are found in his nature and social environment. The effort of the school should

[1] PARKER, *Talks on Pedagogy*, chap. i.

be to continue securing developing results by utilizing and extending the pupil's interests in his natural environment and directing these interests to intelligible ends. The vital part of the educating process is ever this interrelation of the pupil with his environment, nature and social, to the end that he may gain a certain intelligent, physical and mental, adjustment with his environmental situation. Adjustment with environment is not a static, but a dynamic, condition, and in the educating process the work must be of such a nature as will develop a dynamic quality of mind-action which can keep in adjustment with environment change and tendencies. Another principle requiring better-organized consideration, in elementary education, is that educating is a cumulative process from the standpoint of thought-content as well as from the standpoint of form and skill. Considerable attention has been given to progression in language, reading, number, and other forms of expression, but little has been done to utilize and unify progressive thought-content.

The child's observations and sense-experiences bear the same relation to his true thinking and his inferences as words and sentences do to the use of language in expressing thought: they are the vocabulary of thinking, and by addition, adjustment, and readjustment become the controls of human action. It is in the light of unity of thinking that field work should be attempted. Every teacher who has had experience in elementary field work is aware of the difficulties of following a special topic of study, owing to the overwhelming number of things which attract the various pupils and minimize or drown out the main point of the excursion. In the beginnings of field work we should not attempt to remedy this difficulty by limiting the pupil's experience nor by attempts at external inhibition, but to remedy it by some plan of work that will demand every experience and observation afforded by the area studied. Early childhood is the period for acquiring a great store of sense-experience as well as a spirit of enthusiasm and sense alertness, and this child range of interest and curiosity is a quality to be encouraged and extended, and not limited and thwarted by class-room isolation. As the pupil gains in power of investigation or power of holding some special problem in mind

— *i. e.*, when the answer to some problem becomes a mental desire — the selection of the required data from a more or less complex environment will care for itself.

SUBJECT IN FIELD WORK.

Every field environment is composed of a greater or less number of interrelated and intergraded earth-surface types, the physiognomy of which may be dominated by —

1. Topography: hills, mountains, plains, valleys.

2. Physiography: where climatic conditions have greatly modified the topographic aspect of surface by producing deserts, swamps, etc.

3. Vegetation: where the topographic aspect is largely obscured by conditions of vegetation, thickets, forests, etc.

Locally these various surface types are known as —

1. Shores and beaches of lakes and seas.

2. Lakes, lagoons, ponds, marsh, etc.

3. Gullies, ravines, river valleys, with their components of banks, bluffs, flood plains, etc.

4. Ridges, hills, mountains.

(5. Prairie, meadow, forest.)

Each of these areas may be considered as a unit of environment, and as such a unit for study.

The general physiognomy of any one of these units, with its detailed content of topography, minerals, plant life, and animal life, is the subject for student action and effort in field work. Granting, however, that the field affords a special wealth of subjects for study, we have yet to determine to what unified end or purpose this student effort is to tend. The mental influence of the most ideal area may be very small; the naturalist in the mountain is a very different being from the mountaineer who is striving to eke a livelihood from the same rugged environment.

Modern science has formulated two facts of far-reaching significance which may be considered guide-posts in field work: (1) that the surface of the earth is, and has been since its existence, undergoing constant change; (2) that the earth, with its land and water, was not arranged for the convenience of life, but that animals and plants had to live on the earth as they found it and to fit themselves to its changing conditions. This modern

conception of a constantly changing surface, inhabited by an equally developing, changing, and adapting life, differs vastly from the idea of a created earth with life created to inhabit its varieties of topography. The development of a quality of mind-action to grasp intelligently this new conception is vastly different from and superior to the quality of mind which could appreciate the old conception and act under it. It is only through a wide acquaintance with the surface types and their content, and under proper direction, that this desired quality of mind-action can be realized.

The outline of subjects must be developed *pari passu* with the experiences of the student, and this arrangement need in no sense of logical development follow an outline from the standpoint of the adult. It may be fairly stated that the student ends where the adult's outline of subject begins. Considered from the standpoint of adult study or preparation for teaching, the outline for field study in any local environment should be, in general, somewhat as follows:

I. THE ENVIRONMENT AS A UNIT.

1. A topographic map of the area or environment under consideration.

2. Location of the best type topographies within the area: swamp, shore, ravine, prairie, etc. These represent the areas to be visited by class excursions.

3. The forces acting or having acted in the area to mold the present topography: influence of wind, of running water, of wave action, of glaciation, of vulcanism. The details of the method of work of each force being fully investigated.

II. A TYPE TOPOGRAPHY AS A UNIT FOR STUDY — A SWAMP.

1. Conditions essential to the formation of a swamp: (*a*) topographic, (*b*) structural, (*c*) climatic.

2. Various ways in which a swamp may originate: shore barrier, river oxbow, moraine tangle, sinking of earth.

3. The shore and water condjtion of each type of swamp at its genesis. (NOTE.— A lagoon or swamp formed by a barrier along a lakeshore would, at its genesis, be quite different from one formed in a tangle moraine of a glacier.)

4. The genesis, and environment conditions at time of genesis, of the particular swamp under consideration.

5. Changes that have taken place in the swamp since its genesis: (*a*) change in water conditions — fresh to stagnant; cause, (*b*) changes along

swamp border and bottom — soils, character, etc.; (*c*) changes in variety of life-content.

6. Probable life-content of swamp and its margin at its genesis; advent of new forms; zones of distribution.

7. Adaptation of animals and plants to a swamp environment: (*a*) adaptations for living in a swamp environment; (*b*) adaptations for reaching new areas.

8. Influence of life on the area.

9. The ultimate end of the swamp as a swamp, and the procession of life through the area during its topographic life-history.

A third phase of study, having reference to the living forms of the swamp, and intimately related to II, should be included in this field work.

III. STUDY OF LIVING FORMS, COMMON TO THE SWAMP AT THE TIME STUDIED, AS UNITS OF ENVIRONMENT.

1. A fair acquaintance with, and identification of, the living forms, animals and plants, common to the area.

2. Their habits and adaptations: (*a*) life-histories of types, food, enemies, living needs — cage and aquaria study; (*b*) morphology and physiology.

3. The particular swamp conditions which attract various living types to the area: (*a*) purely aquatic life; (*b*) amphibious; (*c*) terrestrial; and their seasonal and zonal distribution.

4. Adaptations to the changing conditions of the swamp: (*a*) migration; (*b*) change of habit and structure to meet changing conditions; (*c*) dying.

Admitting the above to be in a general way the study-content of field work and the working outline of the teacher we are still left to face the main question — the proper use of this subject in the educating process. Elementary education is to be considered in terms of human development. Development is the product of effort induced by an impulse of curiosity, interest, desire, need, accompanied by the reaction of a quickened pulse and a fuller flow of blood to the entire nervous system; this condition is an inherited quality of the human organism. The function of the school is to further this inheritance. The line of movement, so far as related to field work and science, is from miscellaneous sense-experience induced by curiosity to great world-controlling conceptions guided by intelligence.

Elementary field work, for the kindergarten and primary grades, should consist of visits, at different seasons of the year, to

various type areas of the region. The child's curiosity and desire for sense-experience should have fullest play. Playing with waves and currents of water, piling sand, collecting pebbles, the noise of the breakers, the creeping of insects, the movements and songs of birds, the tracks of animals, the swimming of fishes, the business of the ant hill, the odors of plants, the colors of flowers, the feeding of insects on leaf and flower, the hiding-places and burrows of animals, and a multitude of objects and phenomena, are essential needs and experiences in the development of the normal pupil. These experiences are to be gained, not wholly through a sense of study, but through a sense of enjoyment; else the pupil misses the very nexus of child-life. These are the things that actually teach; the teacher needs but guide and direct, seek good environments, and care for the development of skill in expression.

Compare a day in a rich outdoor environment with the best that the class-room can offer, so far as it relates to the emotions essential to development. The return to the school should be accompanied by a limited, well-selected collection of representative materials — minerals, plants, animals. These should find a place in boxes, pots, cages, and aquaria to be used in class study and expression as required. This material, especially if cared for in pots, cages, and aquaria, begins to take on an individuality, leading to an interest in feeding, movement, breathing, etc. It is worth keeping in mind that this room material, the product of a class excursion, though it may be identical in character, is stronger in its education appeal to the class than material placed in the room by the teacher.

Thought of in terms of subject-matter, logically developed, the apparently rambling nature of this work is strikingly evident. Viewed in terms of human growth, the teacher having a definite directing purpose and line of movement, it assumes quite a different aspect. We have been greatly concerned and agitated over the continuity of study in spelling, reading, writing, language, number, etc., but the continuity of true educative thought-content has given less concern.

Growing out of this range of sense-experience there come

periods when some one object or phenomenon holds the child's attention longer than another. This marks the first stage of specialization. By interest in running water the child inhibits the rest of phenomena and objects within his ranges of vision and adds to his running-water experiences further facts of force, change in color, variation in current, movement of materials, deposition, etc. Similarly, by his interest in some animal he inhibits all objects along his pathway in searching out and observing or destroying the animal. From these special interests should be selected topics for class study around which are grouped all the experience of the class. Such questions as may be raised which require further experience and observation should be answered by furthering the students' experience. This differentiation or periodic specialization may continue indefinitely and become more and more specialized, but in all cases it keeps rooted in some type area and moves in the direction of the best thought of the time. It continues unifying and cumulating from the kindergarten stage to the period of original research.

The student power of the individual at any one period of time or stage of progress is judged more by his working ability, on a given problem, than by his ability to answer any test of unrelated questions. Being able to state that running water has been an important factor in earth sculpture is very different from viewing a landscape and detecting the forces that have molded it. Adjustment to environment is worked out by knowledge and contact with environment, and the schools need to be most alert in their every effort to broaden and strengthen the student in his contact with his world-environment.

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THE DEVELOPMENT OF THE SCHOOL MUSEUM.

II.

THE school museum has as its function the solving of problems relating to availability, use, and educational value of various materials collected for and through class study. It should be intimately associated with the school library, which has as its function the solving of problems relating to availability, use, and educational value of reference books, pictures, maps, etc., in school work. Each should be unifying, organically related, working centers for a great part of the school work.

The real value of the museum is to be computed in terms of its influence on the working efficiency and intelligence of the entire student body of the school. Its influence is greatest when its content of material and its arrangement is in intimate accord with the thought-movement of the several branches or phases of study of the school work. If a class was studying the processes, products, and uses of iron, the museum should establish some relation with the study whereby these processes and products could be observed, or could be collected and arranged to show varieties of ore and stages in its development.

THE RISE OF THE SCHOOL MUSEUM.

The organization of a school museum presupposes a shift from the constant use of a text-book to an interrelated use of the text- or reference-book with the actual material. The lowest stage of teaching was when the student was confined to one text-book as the entire source of his effort and information; the advent of supplementary reading marked a distinct stage of progress in teaching, and naturally culminated in the establishment of the school library. This gave the student several points of view, and admitted of some comparison and personal opinion; it fostered individuality. A third stage of advance in teaching is marked by the liberal use of materials common to the student's nature and social environment. It places the student's sense-

experience, observation, and imagination first, and by reading and expression leads him to broader and more correct interpretations and conceptions. So long as the mass of the school work was carried on in the class-room, with the text and the teacher as the sources of knowledge, there was no museum problem, for the simple reason that, since it was all in the book, neither teacher nor pupils felt any distinct need for the use of materials. But, with the advent of laboratories, workshops, field work, and the use of illustrative materials in general class work, there arises a very distinct problem as to economic methods of securing, preserving, and distributing these materials for study. The advantages of centralizing these materials in a museum are the same as the advantages of centralizing the reference books in a library, and modern school architecture should make provision for both, either combined in one room or in separate but adjoining rooms. The nature, variety, and quality of the school-museum materials are problems to be determined by the several classes and subjects of study of the school; or, in other words, by the teaching methods and course of study of the school.

The question resolves itself into: (1) Can the use of actual materials, correlated, so far as possible with the text- and reference-books, render teaching more effective in the educating process than the text- and reference-books alone? (2) From what standpoint of approach, or method of use, may materials be most effective in the educating or developing process? These questions are new in application only. From the point of genesis they belong to the period when the questions relative to the establishing of laboratories in science-teaching were first raised. Since that time many of the things which were then in a hypothetical or experimental stage have, through broader conceptions and application, become great industrial and social factors; they have, by their application, become revolutionizing factors in human progress, both mental and material. There are grave signs that the schools are failing to follow these experiments and experiences through the laboratories and workshops, into their broader application in the nature and social world, and by this failure are leaving the students without broad up-to-date

conceptions of their true environment. The result is that the student, on leaving school, instead of finding himself in working adjustment with the environment for which he was being educated, finds himself out of adjustment and with narrowed experiences because of his school isolation. We may take infinite pains to properly educate students, while at the same time, from lack of broad experience, spontaneous mental action, and opportunity for individual initiative, we are deadening many of their higher individual qualities.

The school museum should mark that stage in school work where students and teachers follow the hints and suggestions of the class-room out into the broader, nature and social, environment, and discover their broader meanings and applications. No special good can come from knowing materials, facts, and phenomena apart from their true environment.

In elementary education the methods and conditions of securing knowledge are of infinitely greater value than the facts themselves. Unless the facts and experiences of the pupils are the product of environment, something organically connected with environment, and existing as they do because of this relation, they have little intrinsic educative value. Science criticism has long since abashed the teacher for attempting the dissection of the crayfish without the student being first acquainted with its haunts and habits; but the teaching of number for number's sake, and demands for expression with nothing to express, has not yet blushed.

The intent of this seeming diversion from the main topic is to point out that the school museum may be a poor factor in a school, unless the school has first felt some need for material in its work. Dust-covered cases, with unused and unkept materials, are not rare sights in these days; just as there was a time of locked cases and unused books in the days that marked the beginnings of school libraries. There is nothing of intrinsic value in materials, for school work, apart from an individual, mental or physical, need for the material. In the manual-training room the student feels a need for wood when he has something to construct; the kind of wood selected should be determined, to a degree, by the

thing to be constructed and the student's knowledge of the woods that are best adapted to the purpose. This feeling of purpose, of use, with the emotion that it carries with it, and experienced by every enthusiastic student who has a problem is something of the emotion which we wish to have students experience in their work with museum materials.

Museum materials may influence the student's life in three ways: (1) by enlarging his range of acquaintance with materials, its occurrence, nature, variety, and properties, through sense and personal contact; (2) by broadening his conception of the relations, occurrence, meaning, uses, and developing possibilities of materials; (3) by exhibiting products representative of high or progressive development in human skill and intelligence, thus giving students broader conceptions of human power and possibilities and higher ideals. I cannot conceive of education being broadly effective unless it takes into well-balanced account these three essentials.

The school-museum collection may grow in three ways: (1) by purchase and donation; (2) by curator collection and exchange; (3) by student collection and exchange. The mass of the collection should be the product of the work of the school; its arrangement an expression of the content and direction of student skill and thought-movement. The museum is equally interested in both living and dead, organic and inorganic materials.

THE DEVELOPMENT OF THE MUSEUM COLLECTION.

1. *Student collection.*—The exact content of the school museum and the arrangement of this content will be determined by the class work and the age of the students using it. The museum of the School of Education is planned to accommodate students from the kindergarten to the adult in the College.

It is desirable to keep in mind that, educating being a cumulative process, the materials must be constantly shifted to keep in accord with the growing thought and conception of the students. The museum must take equally into account working facilities for students and display of material. There is no normal phase of interest in material that is too insignificant for the museum to

recognize and foster. If the most elementary pupils are interested in the variety of shapes and colors of minerals found along the lakeshore, then the museum cultivates that interest by affording a storage place for their collection. It also furthers their interests and experiences by giving the pupils access to a still greater variety of mineral colors and forms.

When at a little later stage these students begin to recognize quartzes, granites, sandstones, limestones, etc., their earlier collections are available for additions, tests, and rearrangements. This experience is again extended by the museum giving them access to a greater variety of quartzes, granites, sandstones, etc. Again their class study may lead them to observe building and decorating stones, and again they readjust and renew their collection from this new standpoint. In this way a number of collections, each representing some different conception of minerals or rocks, are made. The student's conception and experience is gradually broadened, and the museum collection is intimately connected with some natural outdoor environment; and the development of a quality of mind-actions by which this isolated collection is projected into its natural out-of-school setting is one of the most important parts of it. The same idea applies to plants, animals, and industrial products. With a little care in frequent use of names the students are soon on speaking terms with many of the common objects of their environment.

As rapidly as new relations become intelligible the student should be encouraged, during his studies, to collect materials and arrange them in the light of his new conception.

As the student grows in age and experience, the ideas involved in study expand, and more detail and greater range are taken into account. Whereas in the earlier stage variety of stones used in building were taken into account, later he may study: (1) the original locations of these stones (on map); (2) methods of quarrying; (3) wedges, powder, fuse; (4) dressing tools; (5) methods of shipment; (6) variety of uses; (7) polishing tools, etc. And through it all the student is becoming familiar with names, properties, and processes. In many places drawings or sentences are introduced in order to bridge gaps and insure connections. Or

again the study may be bricks, tiling, etc., culminating in a study of all the stages, processes and uses of clay. So also in the field work there are a multitude of demands, if the work is to be most effective, for the collection and arrangement of materials. It would prove an interesting diversion to summarize the number of science generalizations which were made possible only through bringing together, out of time and space, collections of materials.

In the study of earth-surface types of topography we discover that certain forces have been at work molding this topography. There are certain marks by which the presence of these forces are recognized. Interesting groups can be made by collecting mineral materials, as marked and reduced by (1) running water — the variety of materials found along river valleys. (2) Wave action — variety of minerals, their forms and stages of disintegration, as found along a lake- or seashore. (3) Products of glaciation, etc.

Intimately connected with this work is the reproduction of type regions by models. In all instances the material is being used to convey some idea; it is arranged to exhibit some meaning, and the student gradually develops the habit of looking for meaning in materials.

Collecting under this incentive demands of pupils a definite purpose to insure the selection of materials that show some relationship. This working with materials develops, through sense-contact, a quality of mind-action that cannot be developed in any other way. The bringing together of materials from widely separate areas leads to the discovery of relationships that under all other conditions would remain undiscovered, and develops habits of looking for relations where previously they were unsuspected. By gaining some power in detecting obscure relationships the mind gradually gains a certain intelligent mastery over the two great obscuring factors, time and space, and is gradually able to grasp the organic connections of erosion forces, surface forms, and sedimentary rock formations.

So also with some working experience in the school museum the student soon gains some efficiency in the intelligent use of the magnificent collections in our endowed and municipal art, indus-

trial, and natural-history museums. One of the great problems of the elementary and secondary schools is the saving of time. The course of study is already overcrowded, and new studies, which cannot be denied, are knocking for admission. The way out is through some method of study which will increase the working efficiency of the student. One of the ways of gaining efficiency is by giving the student an earlier independent working mastery in school work; less of artificial methods, and more toward stimulating student needs and desire; less of student drudgery, and more enthusiasm and life; less dependence, and more originality. And, above all, the riddance, of the elementary school, of the waste of time and the drudgery of expression is through having something real and vital to express, whether it be through language, reading, writing, color, modeling, or the actual things.

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College of Education.

A SERIES OF LESSONS FOR THE SIXTH GRADE.

THE following outline of work on the St. Lawrence basin is planned for sixth-grade children to be worked out during the autumn quarter. It was chosen both as a study of a typical river in the youthful stage of erosion and as a background for the history of the French settlements in America.

The aims in the work will be to develop vivid images, to assist in the intelligent use of maps and books, and to further the conception of physiographic processes as now at work, shaping and modifying topography.

Because of the approach of winter the field work must necessarily be done in the early part of the quarter. The following physiographic processes which obtain in the St. Lawrence will be worked out in the laboratory and in field trips:

Development of valleys: growth of a river — formation of gorge, flood plain, terrace.

Work of rivers: erosion, transportation, deposition.

Form of divides, shifting of divides.

A graded stream: formation of rapids, falls, and lakes; meaning of base level.

Wave action: drowned coast, building coast.

A trip will be taken to "Englewood on the Hill" to see the water parting between the St. Lawrence and the Mississippi Rivers. This divide is charac-

teristic of those of the St. Lawrence basin generally, and so great has been the importance of these low divides that they will be emphasized. These have caused in part the shifting of drainage which has been so marked in the history of the region. The water parting between Lake Champlain and the Hudson is only 180 feet — only 208 feet above sea level. This fact, in connection with the evidence of the sea having covered the region of Montreal and south of it to a height of 600 feet, opens up a great picture of changed conditions there. It means that at that period the region included between the Atlantic Ocean and the Hudson, Richelieu, and St. Lawrence Rivers was cut off from the mainland entirely; in other words, that New England was an island. The low divides have meant much, too, from a historical standpoint. The divide between the Fox and the Wisconsin Rivers, Lake Michigan and the Des Plaines, Lake Erie and the Mohawk, Lake Erie and the Alleghany, Lake George and the Hudson, have all determined routes of travel and consequent settlements.

We shall visit Glencoe, Ill., where the work of rivers and wave action are well illustrated. A few of the children who can go away for thirty-six hours, at an expense of $5, will be taken to Starved Rock on the Illinois River — a trip of the greatest importance both from the geographic and the historic standpoint. These children will report to the rest of the class upon their return.

Upon these field trips questions arise which in some cases might be answered by repeated visits; but this is impracticable because of the distance of the places from the school. In other cases the processes are so slow that they may not be observed by the children. The laboratory is used to solve just these questions. It consists of a vacant city lot, and a hose fitted with various nozzles which modify the flow of water from a spray to a heavy stream. Here the children may work from two standpoints. If a question arises as to a given phenomenon in river action — as for instance, the formation of falls — they may watch the stream flowing over the ground, note the making of falls, and draw their conclusions. Or they may have a hypothesis for the formation of falls; they may then go out, arrange conditions to test the hypothesis, and observe what follows. A stream of water from the hose may illustrate in one hour the following points in river action: erosion, transportation, deposition, sorting material; making of a gorge, of falls, of rapids, and of lakes. They can see demonstrated the formation of a broad valley, with flood plain and meanders, terraces, ox-bow lakes, deltas, and base-leveling.

By digging a good-sized hole and filling it with water, wave action may be produced by agitating the water. Here the formation of a beach, cliffs, offshore sand reefs, spits, bars, and barriers may be illustrated. The effects of rising and sinking of land may be shown also by inserting a pipe under ground, through which, by draining, the level of the water may be lowered.

or into which the hose may be carried to raise the water level (the relations remaining the same whether the land rises or water sinks).

In addition to the physiography the work will cover the study of the St. Lawrence as a unit of drainage, its location in North America, its area, and its comparison in these particulars with other rivers of North America. It will emphasize the peculiarity of its location on the extreme southern side of its own drainage basin, with seven-eighths of its drainage from the north, and with only Lake Champlain and Lake George and their outlet, the Richelieu River, draining from the south. We shall note the characteristics of the river, with its source and the remarkable widening into the sequence of Great Lakes, its rapids, their interruption to navigation, and the overcoming of these obstacles by the magnificent series of canals; the widening of the lower St. Lawrence into the chain of small lakes, known as Lakes St. Francis, St. Louis, and St. Peter; its final gulf-like breadth from Cape Range, below Quebec, to its end at the western point of Anticosti, where it expands to the width of a hundred miles. We shall study its tributaries; on the north numerous, but navigable only a short distance back from the trunk river, because of the invariable falls and rapids; on the south less numerous, but navigable and important because separated from adjacent river systems by very low divides, as at Rivière du Loup, where the headwaters of the St. John are but twenty-five miles distant, the old route of the war-parties of the Mohawks; the Chaudière rising close to the Kennebec, this being the route which Arnold took when he came from Maine to besiege Quebec; and the Richelieu with its lakes, rising very near to the Hudson, through which valley the tides of invasion swept to and fro during the colonial wars. Farther west are the Miami and the Fox, connecting the St. Lawrence directly with the Mississippi itself. The region, as a whole, would be considered as a great wooded area, comparatively low, and including myriads of fresh-water lakes. Professor Dawson says that this basin alone contains one-half of the fresh water of the globe.

The class will estimate the distances referred to above in length of the river and its comparison with other rivers, by reference to Longmans' atlas, and test their estimates by the scale of miles used on the map. Distance will be interpreted by estimating the time it would take to travel that distance by modern boat, or train, or primitive canoe.

North America will be modeled in sand, and the relation of the St. Lawrence to other drainage systems will be shown. This region will also be modeled separately for the sake of gaining better ideas of relations of its own features, the innumerable lakes, long northern tributaries, and infrequent southern ones.

The children should picture this region so vividly that, as they people it with the early French explorers, they may foresee their movements, their settlements, and the industries which the topographic conditions determined.

For instance, the Saguenay, navigable for seventy-one miles, and the good harbor at Tadanssac predetermined the settlement established there. Quebec, on its impregnable rocky height just beyond Cape Range, where the St. Lawrence narrows and where the St. Charles River joins the main stream, fulfils every requirement for an ideal city and citadel. Again, the Falls of Niagara prevented navigation. In time a portage had to be made about the Falls, and this necessitated two settlements, one at each end of the Portage — one at Fort Niagara on Lake Ontario, and whether at Fort Cayuga or a bit farther south, at Buffalo, is a matter of little import.

If the work has been vital to the children, they will have been brought face to face with difficulties, and will have asked questions concerning measurements, weights, length of time, and exertion of energy. All these are mathematical relations, and so much of number work must be correlated as to answer these questions.

Concerning the Niagara Falls alone, an immense amount of one's thinking is in mathematical relations, if it be clear-cut.

The falls have cut back 7 miles from the escarpment at Queenstown. What is their ultimate fate? They are now cutting back at a rate of 7.65 inches annually on the American side, and 26 inches on the Canadian side. If they continue at this rate, when will they reach Lake Erie and their history be at an end?

The Canadian falls erode 2 feet 2 inches annually. They are 3,000 feet wide and 158 feet high. How many cubic feet are eroded annually? When that is computed, and reduced to a form which is comprehensible — as, for instance, that it erodes enough material to cover a narrow-gauge road 1 foot deep for 42 miles — the children have something of an understanding of the work.

Over the Canadian falls 7,000 tons of water fall per second. This is four-fifths of the total amount. What is the total weight of the water?

Men measure the work of machines by horse-power. One horse-power is the force to lift 33,000 pounds up one foot in one minute. Men have found that the 7,000 tons' weight of water per second can be converted into energy to run their factories. What is the fall of water per minute over the Canadian Falls? Then in these falls 42,000 tons of water pass through 158 feet of space, the height of the falls. Find the horse-power of the Canadian falls. This is four-fifths of the whole. Find the horse-power of the two falls.

An ordinary steam dredge exerts 40 horse-power per hour. How do the falls compare with our mechanical methods of dredging?

One pound of Newport coal furnishes one horse-power of energy for one hour. The great manufacturing interests at Niagara have made the work of the falling water supply the place of fuel. Estimating eight hours per day, find the daily saving on fuel with Newport coal at $7 per ton.

The foregoing problems are given simply as illustrative of the need of

arithmetical work in any part of the subject. The locks of the Sault Ste. Marie, the economy of the canal system, the work of the St. Lawrence in eroding annually, the mining interests of the Superior region, the estimate of time necessary to travel given distances at a given rate — all require the aid of mathematics to be intelligible.

In the minds of the children an immediate use for this work is in the making of a model of the St. Lawrence basin for the school. The model is to be of clay, then cast in plaster of paris and shellacked so that a stream of water may be made to run through it, illustrating the flow of the St. Lawrence, through the Great Lakes, over Niagara, to the sea. The horizontal scale adopted will be 280 miles to 1 foot, but to use this for the vertical scale makes the slope of land imperceptible, therefore for vertical distances the scale will be 150 feet to 1 inch. Because of the various considerations determining the scale which were beyond the children's experience, it had been worked out by the teacher, to be submitted to the children.

Below are given the measurements of the model, as an illustration of the number work involved, as well as the proportions of the resultant model:

TABLE OF DISTANCES AND MEASUREMENTS.

Lake	Actual Distances		Measurements on Model	
	Length	Width	Length	Width
Superior	420 miles	80 miles	1 ft. 6 in.	$3\frac{3}{7}$ in.
Michigan	345	58	1 $2\frac{1}{4}$	$2\frac{7}{8}$
Huron	400	70	1 $5\frac{1}{3}$	3
St. Clair	25	20	$1\frac{1}{4}$	$\frac{6}{7}$
Erie	250	38	$10\frac{5}{7}$	$1\frac{23}{56}$
Ontario	190	40	$8\frac{1}{7}$	$1\frac{5}{7}$

End of Lake Ontario to St. Belle Island, 1,116 miles; 3 feet $11\frac{5}{8}$ inches on model.

Lake	Height Above Sea Level		Depth	
	Actual	On Model	Actual	On Model
Superior	602 ft.	4 in.	900 ft.	6 in.
Michigan	578	$3\frac{4}{5}$	1,000	$6\frac{2}{3}$
Huron	576	$3\frac{5}{6}$	500	$3\frac{1}{3}$
Erie	566	$3\frac{23}{25}$	90	$\frac{3}{5}$
Ontario	240	$1\frac{3}{5}$	412	$2\frac{23}{25}$

ELEVATIONS.

	Actual	On Model
Laurentian tableland, north of St. Lawrence	1,000–1,600 ft.	$6\frac{2}{3}$–$10\frac{2}{3}$ in.
Cape Tourmente	1,920	$12\frac{4}{5}$
Les Ebaulements	2,547	17
Saguenay Mountains	1,800	12
Mountains north of Montreal, rising from the shore of Trembling Lake	2,380	$13\frac{4}{5}$

All measurements will be worked out by the children on the above scale, using the data on distances given by Professor Dawson in Stanford's *Compendium of North America*, Vol. I.

Besides computing the above measurements and making the wooden box to hold the model, much skill must be gained in portraying the region before the final model can be made. This skill will be gained through frequent modeling in sand, and quick blackboard drawing and modeling.

As the children are drawing and modeling, use will be made of pictures of the region. Descriptions will be given, that they may translate the symbol into real proportions and add to it, in thought, the color, sound, and movement in the landscape, as far as may be. In addition to the quick temporary sketches, a series of more permanent illustrations of the region will be made. The children will use different mediums suited to the demands of the subject, as pencil, charcoal, colored crayons, or paints.

The subjects which would cover the typical things of the region are given below, and as many of them will be illustrated as time will permit:

Chalk-modeling of views seen on field trips; typical scenes along the St. Lawrence, as: the shores of the gulf; fishing off the banks; Harbor at Tadoussac; views of the Saguenay; location of Quebec; views of the Laurentians at Lake Edwards in the heart of the mountains on the road from Quebec to Lake St. John; views of the present fort at Quebec; views of Champlain's fort; lower town and Levis from Dufferin Terrace; the long narrow farms, each fronting on the river, which extend from Quebec to Ste. Anne de Beaupré; Montmorency Falls and natural steps; views of Montreal; Notre Dame, Victoria Bridge; Mount Royal; the Laurentians as seen from Mount Royal; Thousand Islands; old fort at Frontenac, now Kingston; view of sand bar in harbor at Toronto; views of Niagara Falls; Niagara gorge and the whirlpool; fort at Niagara on the lake; the locks of Sault Ste. Marie; picture rocks of Lake Superior; industries: lumbering, fishing, the use of the water power at Niagara, and the great wheat-fields of the Northwest.

Written descriptions of places, unless done by the hand of an artist, so as to be very telling, have little power of arousing intense images or interest in children. But if they are planning to make a model of the gulf of the St. Lawrence, for instance, the utmost delight is felt upon finding some such prosaic but clear description as the following: "The New Brunswick shore of the gulf of the St. Lawrence is uniformly low and wooded. Rivers empty into lagoons formed by bars and spits of sand, but there are no shoals or rocks. The south shore of the St. Lawrence for a long distance from Gaspé is high and bold, for mountains rise up from the bank wooded to their summits, and there is little room along the bank except for small fishing hamlets," etc.

But for graphic, poetic descriptions the children cannot do better than

to read from Champlain's *Journal of My Voyages*. Besides the picturing of the region, one gets intensely the spirit of the explorer as this new world first appeared to him. Champlain's *Journal* is published only in one edition, and that retains the old English print; therefore it would be necessary either to read it aloud or to have extracts reprinted. But this is one of the instances where a thing of real literary value may be substituted for mere text-book statements.

This brings us to the relation of the history and geography in the grade. The history for this quarter will be the settlements of the French along the St. Lawrence and Great Lakes, namely, at Tadoussac, Quebec, Montreal, Detroit, Frontenac, Niagara, Mackilimacinac, and Duluth; and will include the discoveries of Cartier, Champlain, Frontenac, Marquette, La Salle, and Tonty. The achievements of La Salle and Marquette carry us to the Mississippi; and still the story would be unfinished, so the *dénouement* of French possessions in America, the French and Indian war, will be briefly told, with few details.

The class will be encouraged to bring magazine pictures or articles associated with this region as a loan collection. The following reading matter will be put into their hands, and any which they think valuable they will catalogue as to title, author, and page. This catalogue would be really valuable, not because of its completeness, but as representative of the children's interests.

CHILDREN'S READING LIST.

TEXT-BOOKS: Longman, *Atlas;* Tarr and McMurray, *Geography,* Books I and II; King, *Geographical Readers;* M. M. George, *Little Journeys to Alaska and Canada;* McMaster, *History of the United States;* Higginson, *Book of American Explorers.*

Selected passages from the following: Carroll, *Illustrated Guide Book and Map of Quebec;* Baedeker, *Guide to Canada;* Chamber, *Guide Book of Quebec;* Stanford, *Compendium of North America,* Vol. I, by S. E. Dawson, Réclus, *Earth and its Inhabitants* (for pictures); Porter, *Niagara Book;* LeMoine, *Picturesque Quebec;* Sir Gilbert Parker, **[1] *Quebec;* Fiske, *Discovery of America;* Champlain, **[1] *Voyages;* Winson, **From Cartier to Frontenac;* Parkman, **Frontenac and New France under Louis XIV; idem,* *[1]*Pioneers of France in the New World; idem, *The Old Régime in Canada; idem, LaSalle and the Great West;* M. H. Catherwood, * "Bells of Ste Anne," *St Nicholas,* Vol. XVI, p. 91, continued on p. 492; G. A. Buffum, "Winter Carnivals in Montreal," *ibid,* Vol. XII, pp. 284-87; W. S. Harwood, "The Great Lakes," *ibid.,* Vol. XVI, p. 195; "Canadian Scenic Splendors," *ibid.,* p. 145 (for pictures only); "Quebec," *ibid.,* p. 554; "Bicycling from Montreal to Ste Anne," *Outing,* Vol. XXXVIII, p. 493; * "Quebec," *New England Magazine,* Vol. XXI, p. 33; *Harper's,* Vol. LXXVII, p. 184; *ibid.,* Vol. LXIX, p. 197; M. H. Catherwood, *Story of Tonty.

TEACHERS' REFERENCES.

**U. S. Geological Survey,* and **Canadian Geological Survey,* of regions considered; Champlain, **Voyages;* Gilbert, **Monograph on Niagara Falls;* Réclus

[1] Especially helpful.

Earth and its inhabitants, "North America," Vol. I; *idem, The Earth;* Le Conte, Scott, Geikie, text-books; Stanford, *Compendium of North America*, Vol. I, by S. E. Dawson; Shaler, *Our Continent;* "Niagara and the Great Lakes," *American Journal of Science*, 3rd Series, Vol. XLIX, 1895; Basil R. H. Hall, "Forty Etchings made from sketches with the Camera Lucida in North America in 1827 and 1828;" James Hall, "Niagara Falls," *Natural History of New York, Geology*, Part IV; Charles Lyell, *Travels in North America;* M. H. Catherwood, **Story of Tonty;* W. D. Howells, *Our Wedding Journey; idem, A Chance Acquaintance;* *Fiske in *Harper's*, Vol. XXV, pp. 65-107; Hinsdale, *The Old Northwest*, Drake, *Making of the Northwest;* Winsor, *Narrative History, Vol IV;* Fiske, **Discovery of America*, Vol. II; Blanchard, *Discovery of the Northwest.* "Quebec," *Canadian Magazine*, Vol. XVI, p. 554; "Newfoundland Seal Hunters," *ibid.*, p. 195; "Canadian Scenic Splendors," *ibid.*, p. 145; several articles, *ibid.*, Vol. X; "Quebec," *New England Magazine*, Vol. XXI, p. 33; "Bicycling from Montreal to Ste Anne," *Outing*, Vol. XXXVIII, p. 423; "Quebec the Crowned City," *Outlook*, Vol. LXVII, p. 521; "Historic Quebec," *Chautauqua*, Vol. XV, p. 422; "Canal System of Canada," *ibid.*, Vol. XVII, p. 302; "Great Lakes — The Locks of the Sault Ste Marie," *Review of Reviews; Studio*, Vol. V, p. 200.

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A SMALL LIBRARY.

It is a difficult undertaking to make a short list of the best books upon any subject, because some books are fully developed in one aspect, while others are of greater value in another. For this reason no two individuals would give the same list, and this which follows cannot be said to be the best in every particular, but has been found most useful in certain lines by the writer.

Teachers of geography in the elementary schools who have access to good libraries may find a wealth of geographical material, but those less fortunately circumstanced should possess at least three good books on the subject, besides the text used by their pupils — a physical geography, a physical atlas, and a general descriptive geography seem indispensable. We are now richer in physical geographies than in any other aspect of the subject, and many good physical geographies can be named. Davis's *Physical Geography* (published by Ginn & Co.; price, $1.40) or Mill's *Realm of Nature* (Charles. Scribner's Sons; $1.50) will be found valuable. In choosing an English physical atlas one is limited in range. Longmans' *New School Atlas* (Longmans, Green & Co.; $1.50) is the best for the price. For a general descriptive geography Mill's *The International Geography* (Appleton & Co.; $3.50) is excellent. This book has no equal of its kind in English. It is made up of contributions from seventy specialists, usually residing in the country that they describe; it is invaluable to any teacher of geography.

If one is able to extend one's geographic library, Stanford's *Compendiums* (published by Stanford, London) are excellent general geographies. This series is composed of two volumes on each of the continents except South America and Australia, which have one each ($3.50 per volume). The volume on the United States by Henry Gannett is very valuable. Herbertson's *Man and His Work* (London: A. & C. Black; $1) and Miss Semple's *American History and its Geographical Conditions* (Houghton, Mifflin & Co.; $3) deal with the human aspect of geography. Chisholm's *Commercial Geography* (Longmans, Green & Co.) has just been revised, and is a most comprehensive and valuable work.

Those desiring a more exhaustive bibliography, will find valuable lists in Mill's *Hints to Teacher and Students on Choice of Geographic Books* (London; $1.20); *Outlines of Geography,* with complete list of references, in *Teachers College Record,* Vol. XI, No. 2 (March, 1901), published by Columbia University Press (Macmillan & Co., agents).

CHILDREN'S TEXTBOOKS.

Maps: The topographic maps published by the United States Geological Survey (Washington, D. C.; 2 cents a piece per hundred) are of great value to the teachers and can be used by children in the upper grades.

Freye's *Complete Geography* (Ginn & Co.; $1.25). This book, at the time of its publication, was an entire departure from the books then in use. Later text-books have largely followed the plan adopted in Freye's *Geography*. It is still extremely valuable, perhaps more so to the teachers than to the children. Among its attractive features are the pictures, maps, and graphic representation.

Tarr and McMurray's *Geographies* (Macmillan & Co.; 60 cents per copy). These geographies are the most exhaustive text-books on the subject published in this country. They will be found very valuable, in particular in the schools where few books are accessible.

Supplementary readers: Carpenter's *Geographic Readers, On the Continents* (American Book Co.). These readers are an outcome of extensive travel on the part of the author that results in a certain vividness which appeals to the children. The industrial and historical aspects of the subject are given fullest treatment.

The Folios of Geologic Atlas of United States (25 cents) are very helpful to the teacher. Relief model of the continents of North America, South America, Eurasia, Africa, Australia, by Howells (Washington, D. C.), are the best that can be had. The set costs $150 — North America, $40; Eurasia, $50; South America, $25; Australia, $15; Africa, $25. The price is prohibitive for most schools. It is to be regretted they cannot be placed in every school.

Physical wall maps: Sydou, Habernicht physical maps ($10.50 per continent), or Rand, McNally & Co.'s physical maps ($3) for each continent.

Magazines: *Journal of Geography* (160 Adams street, Chicago); *National Geographic Magazine* (Washington, D. C.).

Z. B.

BOOKS RECEIVED.

German Composition. By B. MACK DRESDEN, Instructor in German, State Normal School, Oshkosh, Wis. Chicago: American Book Co. Pp. 68, 12mo; cloth. $0.40, *net.*

Bunte Geschichten. By E. M. STOLZE. Chicago: American Book Co., 1903. Pp. 98.

Field and Laboratory Exercises in Physical Geography. By JAMES F. CHAMBERLAIN. Chicago: American Book Co., 1903. Pp. 127.

Annual Report of the Smithsonian Institution, 1901. Washington: Government Printing Office, 1903. Pp. 452, 8vo; cloth.

Annual Report of the Smithsonian Institution, 1902. Washington: Government Printing Office, 1903. 8vo; cloth.

The Insect Folk. By MARGARET W. MORLEY. Boston: Ginn & Co., 1903. Pp. 204, 12mo; cloth.

Two Little Savages. By ERNEST THOMPSON SETON. New York: Doubleday, Page & Co., 1903. Pp. 552, 12mo; cloth. $1.75, *net.*

Teacher's Manual, to Accompany Lessons in Language and Grammar. By HORACE S. AND MARTHA TARBELL. Boston: Ginn & Co., 1903. Pp. 68, 12mo; cloth.

Teacher's Geography Manual, Elements and Grammar School. By ALEXIS EVERETT FRYE. Boston: Ginn & Co., 1903. Pp. 78, cloth.

Scott's Lady of the Lake, Introduction and Notes. By J. CHALMERS, President South Dakota State College. New York: D. Appleton & Co., 1903. Pp. 181, 12mo; cloth.

Literary Leaders of America. By RICHARD BURTON. Chautauqua: The Chautauqua Press, 1903. Pp. 316, 12mo; cloth. $1, *net.*

An introduction to the personalities and work of the leading American writers — Irving, Cooper, Poe, Hawthorne, Emerson, Bryant, Longfellow, Holmes, Whittier, Lowell, Whitman, Lanier, with selections from their writings.

The Evolution of Industrial Society. By RICHARD T. ELY. Chautauqua: The Chautauqua Press, 1903. Pp. —, 12mo; cloth. $1.25, *net.*

Many of the great problems of the day are considered — "Competition," "Social Progress and Race Improvement," "Monopolies and Trusts," "Possibilities of Social Reform."

The Ship of State. By Those at the Helm. Boston: Ginn & Co., 1903. Pp. 264, 12mo; cloth. $0.75, *net.*

The book consists of a series of articles by prominent men, and deals with all the important departments of our government. Mr. Roosevelt has written a chapter on the presidency, Mr. Lodge on the senate, Mr. Long on the navy.

Elementary Plane Geometry. By ALFRED BAKER, Professor of Mathematics, the University of Toronto. Boston: Ginn & Co., 1903. Pp. 146, 12mo; cloth. $0.50, *net.*

The author approaches his subject from the inductive side, and thus breaks loose from the limitations of the deductive and purely mathematical method of treatment. Working with accurate measurements and nicely adjusted instruments, the pupil makes for himself the laws arbitrarily stated in most text-books.

Natural Number Primer. By DAVID GIBBS. Chicago: American Book Co., 1903. Pp. 107, 12mo; cloth. $0.25, *net.*

This primer teaches the most elementary ideas and forms of number and of language at the same time. There are abundant illustrations and very simple drawings which serve as models for the child.

Provincial Types in American Fiction. By HORACE SPENCER FISKE. Chautauqua: The Chautauqua Press, 1903. Pp. —, 12mo; cloth. $1, *net.*

A study of American types as they have been portrayed by novelists whose works have received permanent recognition.